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AWARDS

Australian PC Buyer
November. The Dell Dimension L500c was rated #1 in the Value Desktop Category.
December. The Dell Dimension L500c was rated #1 in the Business PC category.

Australian PC World
Best Buy category
January 2000 - Dell Dimension XPS T700 was rated second in "Best Home and Business PC"
January 2000 - Dell Dimension L500c was ranked second in "Best Business PC Buy"
May 2000 - Dell Dimension L600R Voted #1 in "Best Buys under \$2000"
June 2000 - Dell Dimension XPS B1000R named fastest PC on "A List"

Top products of 1999
The Dell Dimension XPS T500 was rated The Best Home PC of 1999 by the editor and readers alike.

Australian PC Authority
T550 won a "Recommended Award".
December. The Dell Dimension T550 won a "Recommended Award".
January 2000 - Dell Dimension XPS T550 was named "Ultimate PC".
February 2000 - Dell Dimension XPS T550 received the recommended award for the ninth month in a row.
February 2000 - Dell Inspiron 3700 awarded Excellence Award.
March 2000 - Dell Dimension XPS B733 received the speed award in the Super PCs category.
May 2000 - Dell Inspiron 5000 named fastest notebook on "A" list.
June 2000 - Dell Dimension XPS B800R was ranked second in "Best Home PC Buy".

Internet.au
April 2000 - rated the Dell Latitude LS as top of its "Hot Products" section.

Australian Personal Computer
December. The Dell Dimension T500 won "Editors Choice Award".
April 2000 - Dell Dimension XPS B800R won Editors Choice Award.
June 2000 - Dell Precision Workstation 220 won "Editors Choice Award".



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Dell Dimension™ B Series* photographed with options:
17" flat panel monitor and Altec Lansing ADA 880 speakers.



Dell Inspiron™ 5000



Dell Precision™ 220 pictured with
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COMPAQ

EDITORIAL



Digital dilemma

About six months ago, I had an argument with a colleague about the selection process for digital television standards in Australia. He said that we should have just gone with the US digital television system to get it up and running quicker. I argued that the Australian government should choose the best technology, regardless of politics or time frame.

So I was glad to see that the digital TV standard was chosen largely on technological grounds. The choice of the European DVB standard over the US ATSC standard was only made after extensive field tests of each television system. I get the feeling that the government favoured the European system anyway, but the published results of the tests show the DVB standard is superior where it counts. It's not as advanced in terms of product availability as the US standard, but it has better signal quality and better reception at the edge of broadcast zones.

The choice was clearly the right one. A group of US broadcasters recently petitioned the US Federal Trade Commission to reconsider its decision to use the ATSC standard, citing problems with the modulation system it uses. They proposed using the DVB system instead. The FTC rejected the petition, making vague promises about improved receiver and aerial technology overcoming the system's limitations.

In Australia, the lack of commercial products may make the deadline of January 1, 2001, difficult to achieve. Even if broadcasters meet the deadline, nobody will have systems to watch them on. But at least when it all falls into place, we'll have a superior system.

The same can't be said for datacasting. The Federal Government's lips seem firmly attached to the national television broadcasters' butt-cheeks. The Communications Minister's datacasting guidelines are so restrictive he may as well have outlawed it altogether.

From the same department that brought you the Internet censorship laws, we have a regime that limits datacast content by *genre*. Datacasters are not allowed to broadcast anything even vaguely like TV. They can have 10-minute excerpts from TV programs, and that's all. They can only have news if the information is not hosted by a presenter or linked to another item. They're only allowed to provide Web-like content: that is, HTML pages.

It's hardly surprising, then, that most of the nation's aspiring datacasters have scrapped their plans. News Corp, Fairfax and Telstra all had plans in the works. Now none of them do. It's probable that they were hoping to circumvent broadcaster restrictions, but the government has gone way too far. Like the anti-siphoning rules for pay TV, the only effect this has is to disadvantage the consumer. Now nobody gets innovative datacast products. I can't see the national broadcasters doing much in that arena.

Interestingly, datacasters have not yet been forbidden from using the bandwidth for Internet provision. Bandwidth of 20Mbps in a standard 6MHz channel is not to be sniffed at. I wonder what will happen when people start using the Internet — via terrestrial broadcasts or more conventional means — to download movies and TV channels. Will the government have to step in once more to protect the TV stations' precious monopoly?

Nathan Taylor

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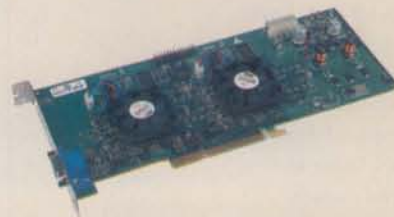
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COVER STORY

The Digital Divide

Despite the growing social and economic importance of the Internet, almost half of all Australians have never used it. How soon will this digital divide become a serious problem, and what can be done about it?



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PCs on the cheap

If you want to own your own system sooner rather than later, a budget machine could be the answer.

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Products reviewed:

Apple iMac
Compaq iPAQ
Gateway Neo
Packard Bell Club 533C
Pioneer 2000 K7-650

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SPECIAL REPORT

WINDOWS ME SPECIAL REPORT

Take a chance on Me

On September 14, Microsoft will release Windows Me, the latest in a long line of primarily consumer-focused operating systems. We've heard the promises before: faster, more stable, more fun to use. Will Windows Me be the OS that delivers, or is it an overpriced minor upgrade?



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FEATURE

PROCESSOR UPDATE

Chips ahoy

It's proving to be an exciting year on the processor front. Check out what the major manufacturers have in the pipeline.



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HTML EDITORS

Let there be site

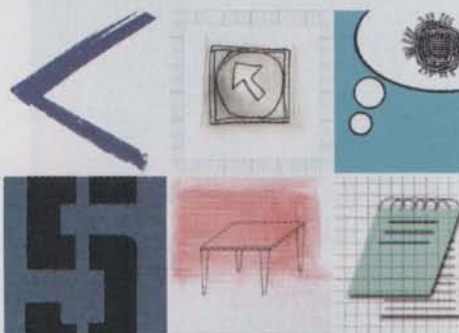
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Adobe PageMill 3.0
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Many software packages now include a 'save as HTML' option. What do dedicated HTML editing packages offer beyond this basic function?

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WINDOWS APPS UNDER LINUX

Windows and Linux: the perfect combination?

Running Windows applications under Linux has always been tricky, but new software has changed this. Will this offer the best of both worlds?

Products reviewed:

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Walk it away

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Removable media is great for transferring files between computers and increasing a system's storage capacity, but which device should you buy?



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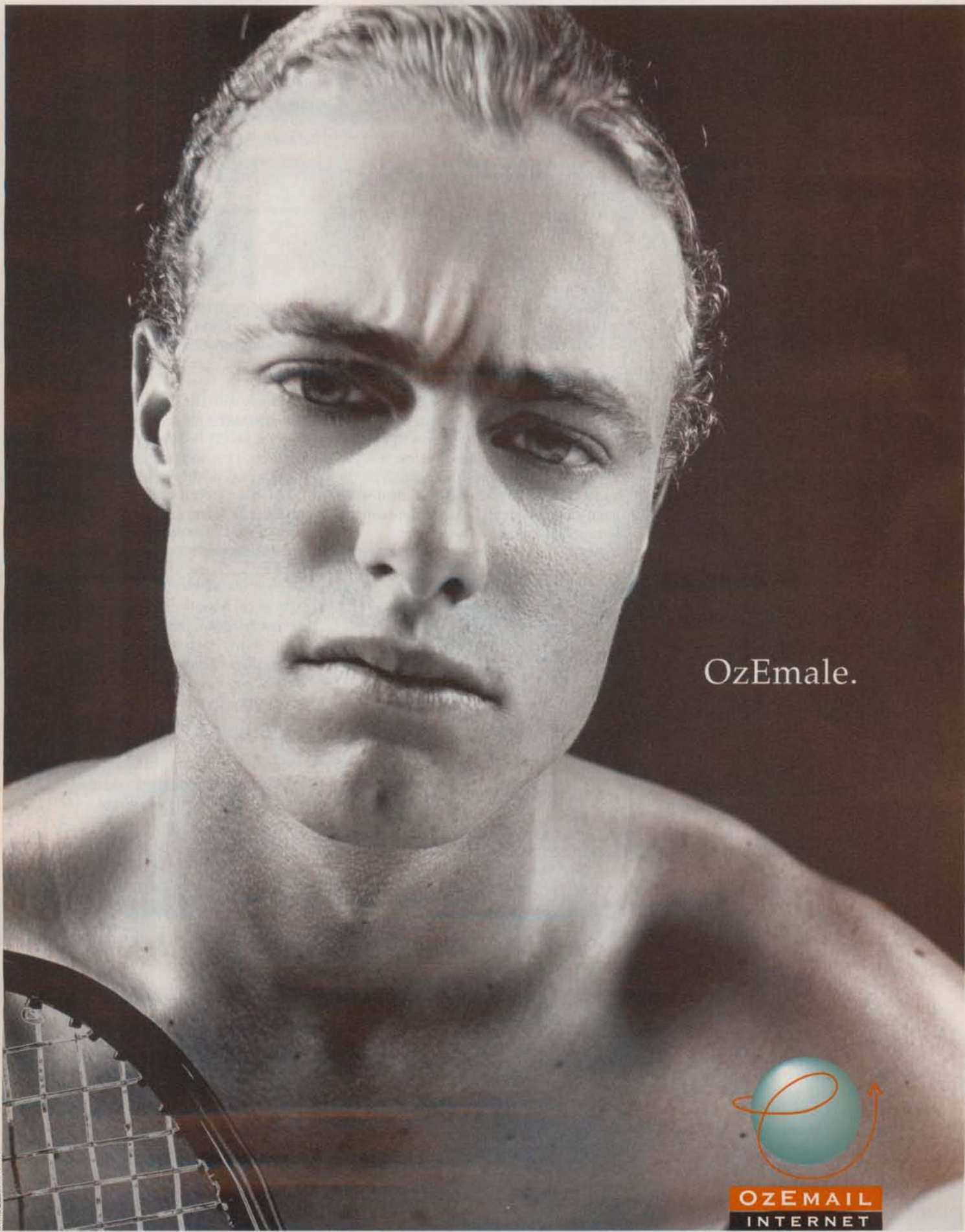
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SPECIAL NOTE REGARDING GST

GST-inclusive prices have been listed in this issue where possible. In a few instances, where distributors were unable to provide a GST-inclusive price at press time, we have included an estimated price and indicated this. Readers are advised to check current pricing with distributors or retailers.



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What's hot on APC August CDs

For a complete listing of programs featured on the cover CDs, see inside the CD insert.

Apps for Windows 98 and Windows 2000

CD 2 is devoted to all the must-have applications for Windows 98 and 2000. If you are buying a new PC, upgrading components or reformatting your hard drive, these programs will make your life easier. Once you have installed the

programs you want, you can use other utilities to test how well it performs, tweak it so it performs better, diagnose problems and protect it from virus attacks.

Contains:

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- Diagnostic tools
- Essential applications



- Antivirus software
- Benchmarking software
- Desktop enhancements

HTML editors: Dreamweaver 3

Get the productivity of a visual Web page layout tool, the control of an HTML editor and the support for dynamic HTML, all in one professional package with Macromedia Dreamweaver. Features include: round trips

between graphical editing mode and your favourite source editor, absolute positioning, cascading style sheets, a dynamic HTML animation timeline, an extensive JavaScript behaviour library, visual table and frame design, a client-side image map editor and a repeating-element library. This program also includes integration code for BBEdit to make it work

seamlessly with Dreamweaver. Try Dreamweaver 3 for yourself — it's under Features on CD 1. Other HTML editors included in this section are: Adobe PageMill 3.0, Allaire HomeSite 4.5, EditLive 1.2, HotDog Professional 6.1, HoTMetaL Pro 6.0.3.143, Namo WebEditor 3.06, ScriptWorx 4.11, NetObjects Fusion 5.0 and WebExpress 3.01.

Two OSes are better than one

This month, Features on CD 1 includes three great Windows applications which run under Linux: VMware for Linux 2.01, Win4Lin 1.0 and Wine.



Win4Lin is the first product where you can use Windows under Linux as you would use Windows on its own, and is extremely fast. Features include direct access to COM and LPT ports, and the ability to create drive mappings to any other partitions on your system. Win4Lin isn't too taxing on your RAM and CPU.

GameZone

Gunship is a helicopter combat game that will appeal to flight simulator fans as well as lovers of fast-paced action. There are three menacing helicopter gunships that you can fly: the AH64-D Apache, the

Eurocopter Tiger, and the Russian Mi-28 Havoc.

Theocracy is a real time strategy game set in Aztec Mexico.

Demo versions of both these games are included in GameZone, on CD 1.

For reviews, see page 177.



Your guide to the cover CDs

The APC cover CDs complement both the magazine and **apcmag.com**. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and Web browsers.

Each piece of software includes instructions on whether you will need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included on the CD cover.

The CDs have been created in HTML. You do not need any special software to access the CDs, other than a standard browser.

The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the CDs is provided as is, without any warranty, express or implied. Complete terms and conditions are included on the CD itself; click on the Conditions of Use link for details.

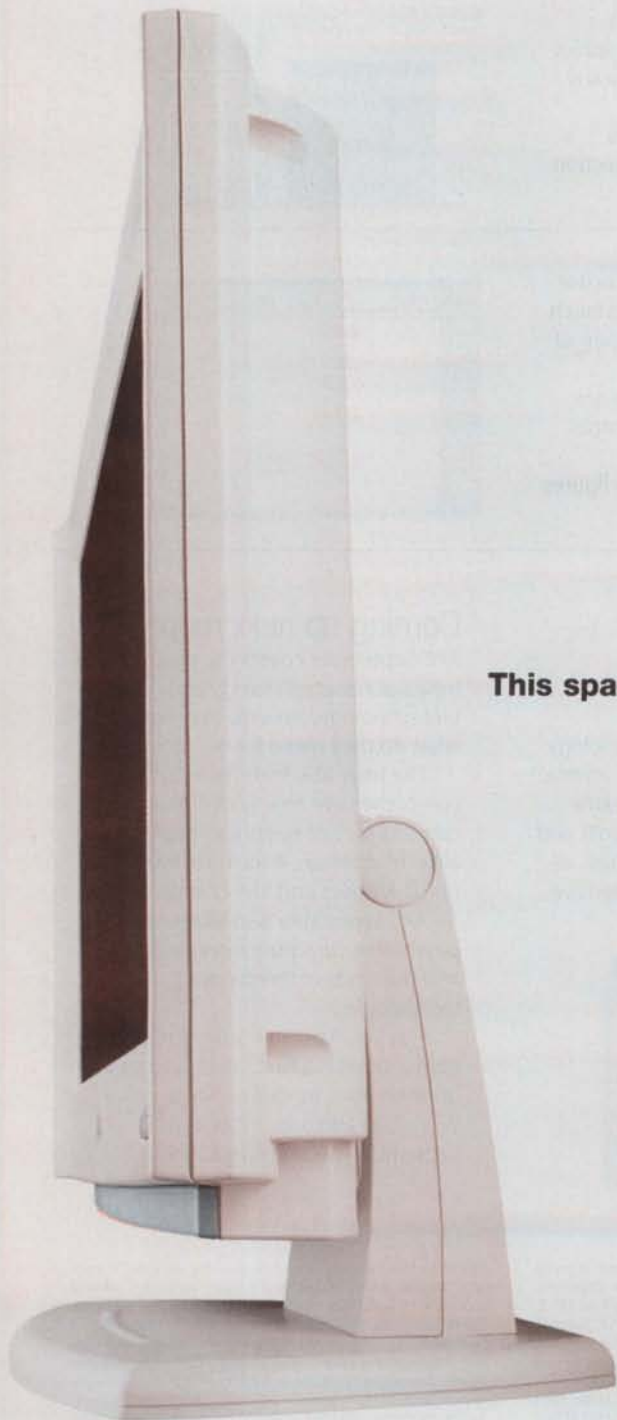
How to run the CDs

Before using the CDs, please read the Conditions of Use online at **apcmag.com/apcmag.cd**. These CDs use an Autorun feature for Windows 95, 98 and NT systems. Just insert a cover CD and your browser will automatically load with the APC CD front page. Users of other platforms can simply launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD. For further information, see the instructions on the back of the CD insert.

You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

While APC has taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

If you have any problems, refer to the Help section on the back of the CD insert.



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WHAT'S HOT ON APC AUGUST CDs CONTINUED...

FreeHand 9

FreeHand 9 is a sophisticated, vector-based illustration package for print and Web publishing. This latest version features a number of enhancements in both design and performance. Equipped with several

new tools, FreeHand 9 is definitely a worthwhile upgrade for creating graphics and animations for the Web, particularly with its support for Flash export.

You will find a trial version of this program on CD 1 in the Windows section of New & Hot.

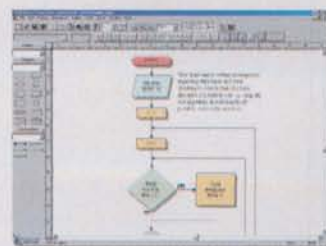


WizFlow Flowcharter 3.0d

Create professional looking flowcharts for work or school. Flowcharting objects can be placed on the workspace, and connecting them with arrows is a breeze. The relationships between objects are remembered, and when you move things around, WizFlow makes automatic

adjustments to help keep them in order. Standard word processing features (such as subscript, superscript, and rotation of text) are also available.

WizFlow lets you define shape styles using over a hundred predefined shapes and arrowheads. As you draw your diagram, WizFlow connects lines to figures and attaches labels to lines.

What's on the **apcmag.com** family of sites**apcmag.com**

<http://apcmag.com/>

apcmag.com includes a complete archive of each issue of Australia's leading technology magazine, as well as handy online resources such as discussion boards and online subscriptions. Keep watching the site for major changes in the coming months.

**Newsire**

<http://newsire.com.au/>

Our 100% Australian real time technology news service, **Newsire**, has had a revamp! Check out our sleek new look and extra features such as interactive reader polls and enhanced search facility. Plus, as usual, all the latest technology news with extensive links and related resources.



Coming up next month

APC September covers the controversial topics of nanotechnology and biotechnology. How do they work, and what do they mean for our future?

The issue also features a comprehensive review of digital cameras for hobbyists and professionals alike. In addition, it includes roundups of CD-R drives and low-cost projectors.

APC September also examines the possibilities for future storage systems, and the limits of the current technologies.

Plus you'll find a horde of regular items, including First Takes, games and book reviews, as well as news, Workshop and a lot more in APC September, on sale August 16.

Conditions of entry

These conditions apply to all competitions in APC August, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC August. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail August 15. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of ACP Publishing Pty Limited, the promoter, 54 Park Street, Sydney NSW 1028. The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring between the publishing date and the date the prizes are claimed is not the responsibility of the promoter. Winners will be notified by security post and their names published in APC October.

Subscription promotion (page 96)

1. Information on how to enter and prize forms part of these conditions of entry.

2. Entry is open to all residents of Australia who subscribe to The Bulletin, Australian Personal Computer and PC User between 07/06/00 and 28/08/00. Entry is subject to a valid

signature against a valid credit card or, if payment is made by cheque, the cheque must be cleared for payment. Subscriptions are to be sent to The Bulletin, Reply Paid 1512, Sydney, 2001; APC and PC User, Reply Paid 3357, Sydney, 2001, or 13 61 16. Employees and their immediate families of the Promoter and its agencies associated with this promotion are ineligible.

3. Promotion commences 07/06/00. Entries close 5pm 28/08/00. The draw will take place at Level 11, 54 Park Street, Sydney, NSW 2000 at 11am on 04/09/00. Winner will be notified by mail and their name published in the Public Notices section of The Australian on 12/09/2000. Judges' decision is final and no correspondence will be entered into.

4. The first valid entry drawn will win a trip for 2 adults on a 7-day cruise on board the Silver Cloud departing from Istanbul (on 20/10/00) and finishing in Haifa valued at up to AUD\$43,923 including 2 return business class airfares (ex. Sydney) flying Air France to Paris and then onto Istanbul to board the cruise for 7 days. Additional meals, alcohol, spending money, visas, passports, taxes, insurance and all other ancillary costs are the responsibility of the winner. Domestic and International transfers are excluded except in the event of a Victorian winner whereby 2 return economy airfares will be provided to and from Sydney. Winner must be available to take prize on or around 16/10/00. Winner must have a passport that is valid for a minimum 6 months beyond their return. Prize is not transferable or exchangeable and

cannot be taken as cash. Any change in the value of the prize occurring between 19/05/00 and the date the prize is claimed is not the responsibility of the Promoter. The business class flights and cruise prize value is based on the published non discounted recommended retail value at the time of printing. Any change in this value due to currency fluctuation or travel agency specials are not the responsibility of ACP and will be the responsibility of the winner.

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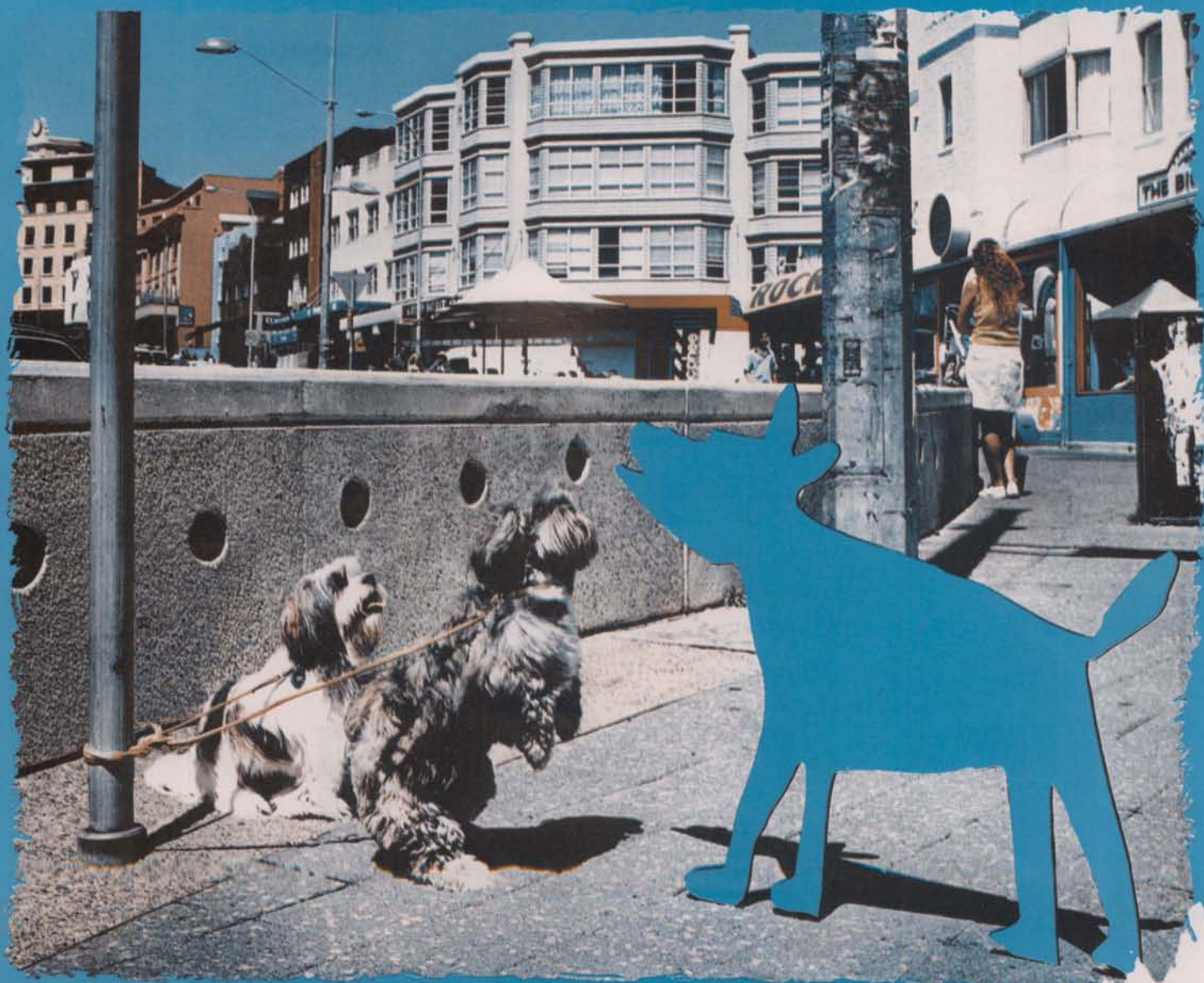
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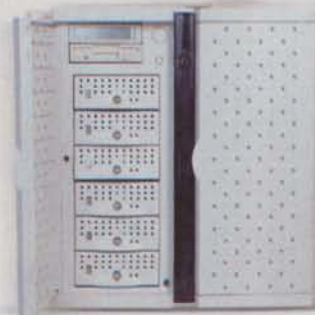
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THE BUYER BOUGHT

Austar's \$30 million eisa gamble

Satellite provider Austar United Communications is prepared to invest more than \$30 million in a rescue bid for ISP eisa, which has been staring down the barrel of ruin after the collapse of its OzEmail takeover bid (see APC July, page 19).

Austar is offering 20 cents for each eisa share, giving the company a total value of \$24.4 million, unless eisa directors can negotiate a better offer by mid-August. As well, Austar is immediately loaning eisa \$7.5 million in working capital.

At a meeting outlining details of the million-dollar acquisition, Austar chief executive John Porter said Austar will use eisa's existing network to expand its regional dialup Internet coverage. Austar will fund the acquisition from its \$500 million cash store.

With CEO Damien Brady **nowhere in sight**, eisa chairperson Evan Rees was left to urge

Continued on page 22

COPYRIGHT CHANGE

Will parallel imports bring cheaper software?

Consumers may be thrilled with the possibility of paying less for software and games, but a Federal Government decision to relax import laws relating to software has received a mixed reaction from the IT industry.

From as early as August, the Copyright Act will be amended to allow for the parallel importation of software, computer and console games, as well as books, periodicals and printed music. In a statement released to announce the move, government officials said Australian businesses and consumers "will particularly benefit from the abolition of import restrictions on packaged business and educational software".

The local software industry has long resisted the introduction of parallel importing, arguing that users won't get proper support, as only locally **purchased copies are eligible** for Australian support lines; piracy will run rampant; and local developers will be disad-

Comparing prices

Parallel importing can drastically reduce software prices.

- The anticipated upgrade price for Windows Me in Australia will be \$206. In the US, the same product is expected to sell for \$US109. Even with a weak Australian dollar, this converts to roughly \$180, a saving of around 12%.
- Some products such as CAD tools will be even cheaper, but others (such as accounting systems) may not suit Australian users.

vantaged. Similar arguments were mounted by the local music industry when parallel importing of CDs was introduced last year.

The Australian Competition and Consumer Commission (ACCC), which has been advocating the changes for many years, welcomed the decision. "Australia has long been a hostage to the interests of multinational companies in publishing and computer software, and consumers have paid through the nose for many years," chairperson Allan Fels said.

The Australian Consumers Association (ACA) agreed, saying the move was "well overdue" and could result in consumers paying up to 20% less for their software. "When retailers can shop around for alternative sources of supply overseas they can get a better deal and the benefits will flow to consumers," ACA senior policy officer for IT and communications Charles Britton said.

However, not all retailers **predict immediate benefits** from the new regime. John

Continued on page 22



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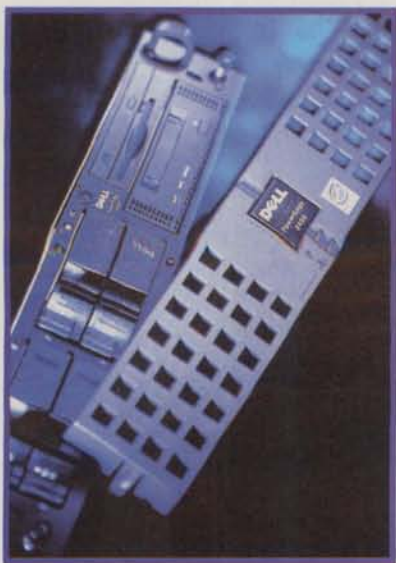


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Austar's \$30 million eisa gamble

Continued from page 19

eisa shareholders to accept Austar's offer in the absence of a higher bid. "We think this is a good marriage," he said. "It's not a good result for shareholders, but better than some bleak predictions."

Rees said that in the event of a better offer, eisa will walk away from Austar. However, he confirmed that eisa is not currently in discussion with any other potential buyers. Austar has yet to decide if it will retain the tainted eisa brand name.

Porter said all issues relating to OzEmail will be left to eisa's directors. However, he would not rule out the possibility of Austar making a bid for OzEmail.

In a related and unusual clause, Austar will increase the price of its offer if eisa is successful in recovering the \$20 million deposit it paid to

OzEmail as part of its failed takeover bid. eisa is planning legal action to recover the money, which OzEmail owner UUNet plans to retain.

Despite discounting one-third of his holding, controversial company director Johnson Wang stands to make more than \$11.3 million from the takeover. Wang's company KTX Holdings has agreed to sell 30.2 million of its shares to Austar for a grand total of \$1. However, that still leaves KTX Holdings with 56.6 million shares in the company, for which Austar will pay 20 cents each, leaving KTX Holdings with a healthy payout of more than \$11.3 million. Wang's sister-in-law Delphia Lai also holds 2 million shares in the company.

Fiona Angus and Angus Kidman

PAYMENT PROBLEMS

Business warms to the Net

Small business is becoming increasingly comfortable with using the Internet as a communications and research medium, but it remains less committed to transactions online, a new study has shown.

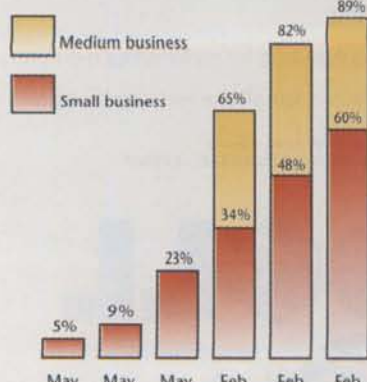
A report issued by the National Office of the Information Economy (NOIE) in

conjunction with Telstra's Yellow Pages division found that 60% of small businesses (those with less than 20 employees) and 89% of medium businesses now had a Net connection. Email is used by 54% of small businesses, and 76% use the Internet to research possible purchases.

These figures represent a major acceptance of the Net as a communications medium, but other business uses aren't as prevalent. Only 25% of small businesses reported having their own site online, and only 19% had paid for business products or services online. Similarly, only 20% of connected businesses across the small and medium categories had set themselves up to take orders and payments

online.

Small business moves online



Will parallel imports bring cheaper software?

Continued from page 19

Slacksmith, general manager of computers and communications at Harvey Norman, said the government's decision would "have no effect in the short term whatsoever" as the retailer would continue to support Australian suppliers. "We have established relationships with vendors and would like to continue to support products locally," he said. "Where we don't have established relationships, there would be an opportunity for us to bring products in from overseas."

Rob Durie, executive director of the Australian Information Industry Association (AIIA), said he was surprised by the government's decision. "We haven't been consulted," he said. "There is no justification for allowing the parallel importation of software. We are the cheapest legitimate market outside North America for software."

in an influx of pirated software, as it would become "so much harder to detect".

Games people play

Plans to make computer games faster and cheaper meet a stumbling block in the face of the government's own strict classification laws, despite the fact that computer games were specifically singled out as beneficiaries of the new legislation.

Existing regulations on the sale of computer games mean that importers can't simply import bulk supplies of games titles and sell them onto the Australian market. All titles must be classified by the Office of Film and Literature Classification (OFLC) before being released locally. It is illegal to sell unclassified games.

OFLC director Des Clarke told APC that the organisation is concerned about unclassified

"There is no justification for allowing the parallel importation of software. We are the cheapest legitimate market outside North America for software."

The Australian Visual Software Distributors Association (AVSDA), which represents PC and console game distributors, echoed Durie's sentiments. "This decision has been made following a report by the ACCC which found our prices 32% higher compared with the US, but they only looked at seven titles," AVSDA CEO Megan Simes said. "We had a very robust study commissioned which found US prices were 7% lower than Australian prices. Games in the UK, which run on the same PAL system as Australia, were 32% more expensive." Simes said the relaxation of the parallel import laws would result

games becoming available in the Australian market. "It's a concern that people who buy games, usually parents, won't know what classification the game has received." Clarke said the Australian Customs Service would be watching out for bulk software entering Australia and notifying the OFLC of any anomalies.

Any distributor can submit a title to the OFLC for classification, but doing so adds to the expense of shipping the title and delays its release. The OFLC faces the problem of being bombarded by multiple submissions to classify the same game.

Roulla Yiacoumi and Angus Kidman



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IT'S WHERE YOU LIVE

IT salaries skewed towards Sydney

IT staff in Sydney and Melbourne typically earn more than those living in smaller cities, according to a survey of 55 IT companies.

The *Salary Survey 2000* by Hays Personnel Services found that IT salaries are high compared to other occupations, but there are big differences depending on the location of the job and the specialisation required.

An IT director in Sydney typically receives \$170,000, but the same job in Adelaide and Brisbane only attracts a \$100,000 salary. PC support staff in Melbourne and Brisbane typically earn \$35,000, compared to \$40,000 in Syd-

ney. A Unix system administrator in Melbourne earns \$75,000, but the going rate in Brisbane is only \$55,000.

There is greater equality among enterprise resource planning (ERP) staff, and most salaries are about \$80,000 throughout Australia.

For programmers, the biggest salaries are in Java development, which typically attracts \$80,000 in Sydney. IBM mainframe programmers and PC programmers are languishing between \$45,000 and \$50,000 across the country.

The lowest paid career in the IT sector is helpdesk support, which attracts between \$30,000 and \$40,000.

Despite offering respectable starting salaries for people with no relevant experience, IT staff are the hardest workers to recruit after accountants.

The situation is unlikely to improve in the short term, and the survey predicts that there will be a large growth in the demand for contract positions in the IT sector. A national survey of 3,000 employers by Morgan & Banks found 48.4% of

businesses intend to create new IT jobs this year.

The survey also forecasts significant upheaval for IT workers over the next 12 months. Almost 70% of businesses indicated they will be implementing 'operational/structural changes' to their IT workforce. Of these, 84% said the changes will have a 'positive effect on staff numbers'.

Fiona Angus

TELCO WARS

Competition review raises new concerns over Telstra

A proposed review of Australia's telecommunications competition legislation is already causing controversy, and reports suggest that restraints on Telstra may be lifted have caused outrage among telcos.

In early June, Senator Richard Alston officially commissioned a Productivity Commission inquiry into telecommunications competition. The review was scheduled when the telecommunications industry was deregulated in 1997, and is aimed at "identifying whether the regulatory regime is working as effectively as possible and that the benefits of competition regulation are being delivered to customers".

The telecommunications industry is concerned that the review may lead to some of the current rules governing Telstra's conduct in the deregulated environment — an area controlled by the Australian Competition and Consumer Commission (ACCC) — to be relaxed, making it easier for the company to maintain its dominant position.

Since deregulation, Telstra has repeatedly clashed with its rivals over issues such as access to the local loop and its interconnection charges. In April, Telstra was ordered to cut interconnection charges after an investigation found that they were 30% too high.

Angus Kidman

Programmers salaries across Australia



Source: Hays Personnel Services

News Roundup

• An Adelaide entrepreneur says he has been offered \$100,000 to sell the digitaltelevision.com.au domain he registered last November for \$125. Ian Scarffe, who runs a mobile computer cleaning service, said he is considering the offer, but doesn't think he will sell because the price is not high enough. Scarffe said he cannot name the company that made

the offer, as confidential negotiations are still taking place. However, he believes the offer is genuine "because of the people who made it".

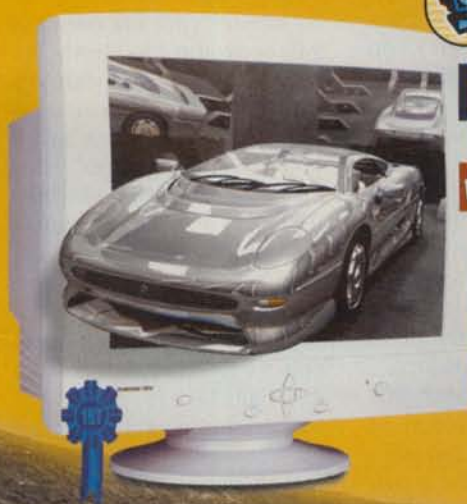
• In a move being touted as a world first, online gift store wishlist.com.au has announced it will use BP service stations as collection points for its goods sold online. By partnering with BP, which runs 24-hour service stations, wishlist.com.au aims to offer a complete service that

doesn't rely on post offices or couriers. The campaign, which commences on August 10, will initially target 250 metropolitan stations.

• A survey by research company WebSideStory claims that 86% of Web surfers now use Internet Explorer. Only 13.9% use Netscape, and just a tiny 0.02% use other browsers such as Opera. WebSideStory bases its data on statistics collected from Web sites claiming a total

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DIGITAL TV

Datacasting uproar

The Federal Government has managed to have its legislation on digital TV and datacasting — the broadcasting of Internet and other content using spare digital TV spectrum — passed into law. However, it remains unclear whether any business actually plans to offer a datacasting service, following the withdrawal from trials of three major prospective datacasters.

Under the legislation, datacasters are not allowed to broadcast any service that appears to compete directly with television broadcasts (see APC July, page 24). Internet content can be broadcast, but only if it does not appear to resemble standard TV broadcasting.

One obvious problem with such an approach is the thousands of Web sites which offer streaming video footage. An inquiry into the issue of whether this constitutes broadcasting will be carried out by the Australian Broadcasting Authority over the next 18 months.

A bigger problem for the government is that few parties appear interested in taking up the datacasting opportunity. Fairfax, News Ltd and Telstra all withdrew from proposed datacasting trials when it became clear that the government would

not back away from the genre-based approach.

Telstra said it was "disappointed" with the legislation. "The opportunity to provide new and innovative services to Australian consumers may not be realised unless changes are made to the bill," warns a statement from the company.

Telstra said the "significant outlay" required, the high level of restrictions imposed on datacasters and the government's uncertainty concerning the timing of spectrum allocation combined to make any trial unviable.

IT minister Senator Richard Alston downplayed such issues. "The government is confident that these amendments will strengthen the business case for the aspirant datacasters," Alston said. "As a result, the Government expects a healthy level of interest in the new datacasting licences."

The government managed to gain Labor support for the legislation by allowing the ABC and SBS to offer multi-channel broadcasts, which commercial networks are barred from doing. However, the extra channel content can only be in a restricted number of genres, including religious and educational programming.

**Angus Kidman and
Roulla Yiaccoumi**

NET INVESTMENT

ASIC eases Net rules

The Australian Securities and Investment Commission (ASIC) will no longer require people operating investment advice Web sites to hold a licence, under a proposal being considered.

ASIC has released a policy paper on Net chat sites for public comment. Under the guidelines, people operating Internet discussion sites will not be forced to obtain an ASIC licence.

Until now, ASIC has taken a dim view of individuals posting stock tips, personal opinions of particular stocks and information about listed companies. In May, the owner of financial site The Chimes was jailed after being found in contempt of court (see APC July, page 22). Stephen Lewis Matthews was found guilty of contempt of court after he continued publishing a financial discussion forum when the Australian Federal Court had ordered him to remove the site.

It seems ASIC has accepted the Internet as a legitimate discussion forum and is now seeking to "strike a balance between the need to foster investors' access to an inexpensive and easy method of self-education using the Internet, and the need to ensure consumer protection".

Internet chat site operators will be required to clearly display disclosures and warnings informing visitors that the operator of the site does not hold a licence and so a "danger" exists on relying on the published material to make investment decisions. Operators must also keep "proper identities" of those posting on the site.

ASIC director of regulatory policy Malcolm Rodgers told APC that there is "no use pretending this [policy] will stamp out all the mischief" but that it would impose "some limitations on the abusive behaviour we're concerned about".

Rodgers said the restrictions would "not turn site operators into active police", but that they should accept some responsibility for postings on their sites. Operators must keep records, including an active email address, user name and password, for every person posting data online.

Roulla Yiaccoumi



The Chimes went offshore.

News Roundup

audience of 50 million users. The figures also show the dominance of Windows on the desktop; 93.6% of surfers tracked by the company were using a Windows OS, compared to 2.53% using a Mac. About 3.48% used an 'other' OS, and 0.36% used Unix (the study didn't say whether Linux users fell into this category).

● Melbourne IT has abruptly cancelled a deal that could have seen it supply up to

2.7 million domain name registrations at bulk rates, barely one month after the partnership was announced. The company has terminated a deal between its Internet Names WorldWide (INWW) business and Namezero.com, a US startup that provides free domain names and associated services. The partnership had been announced in May, but fell apart over Namezero.com's desire for INWW to subsidise domain name provision.

● Australian Exhibition Services (AES), the company behind major annual PC shows

throughout Australia including the PC/IT show and the Linux/Open Source Expo, has been bought out by a US rival. AES has been acquired by Diversified Business Communications, a US company specialising in exhibitions and trade publications. Terms of the deal were not disclosed.

For complete versions of these and many other stories, be sure to check into <http://newswire.com.au>.

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A US court has ruled that Microsoft must be split in two. Courtroom delays may stay the decision, but what would it mean for the company?

Microsoft: Divided we stand

The future of Microsoft — the world's largest and most profitable software company — is in doubt after a ruling by an antitrust judge that the company must be split into two separate divisions.

In early June, Judge Thomas Jackson issued his final ruling in the case, which has dragged on for over two years. Under the ruling, Microsoft must split itself into two companies, one for its operating systems and the other covering its remaining software products. This remedy reflects the US Department of Justice's (DOJ) recommendation, but doesn't go as far as an earlier proposal discussed by Jackson, which would have split the company into three divisions.

In practice, any split could be some time in coming. Jackson has asked the Supreme Court to handle an appeal by Microsoft against the ruling, raising the possibility that a decision on the case might not be reached before October (no schedule had been set when *APC* went to press).

If implemented, the ruling would require radical changes in the company's business practices. Microsoft must provide a detailed plan for the split into two divisions, and must complete the process within 12 months. However, many details of how that split would work are already prescribed.

Crucially, Jackson has assigned Internet Explorer to the applications business, rejecting Microsoft's argument that IE is inseparable from Windows. This is likely to prove a bone of contention with Microsoft.

The division into two companies must include staff and intellectual property as well as the products themselves. Software components that are used by both the OS and applications must be assigned to the applications business. However, the OS company will be allowed to use these royalty-free in its own products, and develop products based on them. There is one important exception: products must not be derived from IE and distributed by the OS business.

The judgement also makes provision against a 'poison pill' response, where Microsoft attempts to run down one of the

two businesses prior to divestiture, or attempts to more closely integrate its existing products to create a larger number of common components.

Following the split, each company would be banned from acquiring assets from the other, or from recombining. They would also be barred from joint ventures to sell, license or distribute each other's products, and from exchanging technical information that was not also made freely available to third-party companies.



For the first three years after the split, each company must provide the court with reports every three months, detailing any transactions between the two businesses. They must also agree to inspections of source code and other documents by the court or other named parties. Microsoft must appoint a chief compliance officer to ensure that the agreement is adhered to. As well as detailing the split, Jackson's ruling also provides guidelines on contractual arrangements for licensing Windows, and restrictions on how the product can be developed.

Appealing

Microsoft is continuing to pin its hopes on an appeal to a higher court. "We have a very strong case on appeal, and we look forward to resolving these issues through the appeals process and putting this case behind us once and for all," chairperson Bill Gates said. The company is also pushing ahead with new products such as Windows Me (see 'Take a chance on Me', page 34), continuing its longstanding and contentious practice of bundling new applications and features with OSes.

Microsoft won't be able to draw much comfort from the roasting it received in Jackson's final ruling on the case. He devotes considerable space to explaining why he rejected Microsoft's recent requests for more time to respond to the proposed remedies. Microsoft's continued refusal to change behaviour makes a swift resolution vital, Jackson argued in a damning indictment of the company. "Microsoft has proved untrustworthy in the past. In earlier proceedings in which a preliminary injunction was entered, Microsoft's purported compliance with that injunction while it was on appeal was illusory and its explanation disingenuous."

The Australian Competition and Consumer Commission's (ACCC's) interest in Microsoft has also increased following the antitrust finding. "This outcome is a signal to business that competition laws apply everywhere, with an obviously warranted focus on the high technology area," ACCC acting chairperson Alan Asher said. "There is no reason to assume that information technology and the Internet are a rule-free zone. Further, it reinforces the defeasibility of intellectual property rights in the event that they are used as a facade for blatant anticompetitive behaviour."

Asher said that the ACCC had received a number of complaints about Microsoft's impact on Australian consumers, but would examine its response to the court ruling before taking further action.

Angus Kidman

PROBLEM

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Government plans for a 12-month ban on new online gaming sites have set it on a collision course with a multibillion dollar industry.

Government gambles on Net ban

Key players in Australia's online gambling sector have reacted with a mixture of bemusement and contempt to the Federal Government's proposal for a 12-month moratorium on new Internet gaming services, and its intention to permanently ban online gambling in Australia.

The Federal Government is pushing ahead with plans to ban all new online gambling services in Australia for a year, with a view to a permanent ban thereafter. This is despite widespread resistance from state governments and the gaming industry.

Legislation for the ban will be introduced in the spring session of Parliament beginning in August. The ban, which was flagged by IT minister Richard Alston last December, will apply to the rollout of services, rather than the licensing of them. Penalties of up to \$1.1 million per day will be applied to services defying the moratorium.

The legislation will cover all forms of interactive gambling, including telephone and Net services. In a move designed to placate state governments, telephone betting is excluded.

Alston said the government remains committed to a permanent ban on online gambling, and will investigate the consequences of such a move during the moratorium.

Existing site operators have spoken out against the move. *gamble.com.au* chief executive officer Andrew Spinks accused the government of not making the effort to consult with industry players, or to understand the issues.

Spinks said operators and gamblers will relocate overseas to unregulated jurisdictions. *gamble.com.au* is an international company licensed in Vanuatu, so the services it currently provides will be unaffected by the ban. "There is no logic to the legislation," he said. "Australians can gamble at 700 locations overseas, with no legislation and no responsible operators." According to Spinks, online gaming could be earning Australia \$9 billion in export earnings by 2003, if a responsible regulatory approach were taken.

At present, the Commonwealth makes no money from online gambling but is "left

to pick up the bill" for problem gamblers, a spokesperson for Alston said. The government believes online gambling has the potential to "put a virtual poker machine in every home".

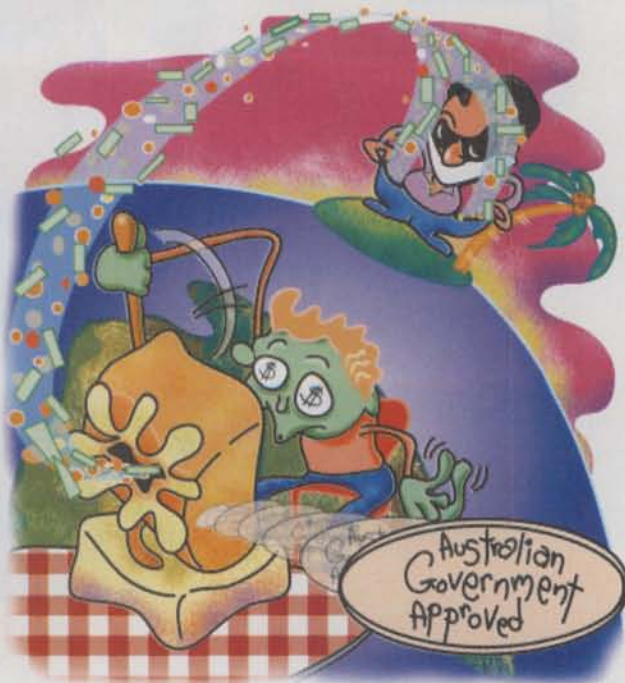
According to the government, there is only one Australian gaming site—*Lasseters Online*—that will escape the moratorium, which will be backdated to May 19, 2000. *Lasseters* executive manager David Ohlson said that current regulation was extremely tough. "We are the most regulated site on the Internet," he said.

Ohlson said that elements in the government do not understand the nature of online gambling, and it is hypocritical to restrict Internet gambling but not telephone gambling. "There is no difference between Internet and telephone gaming except the communications tool used. There is a longstanding interest with phone betting," he said.

The only other online gambling site which claims it can bypass the moratorium is *Gocorp*, which has yet to prove to the government that it was operating before the May 19 cut-off. *Gocorp* has chosen to provide its services only to Queensland and overseas customers.

Gocorp chief executive officer Paul Appleby said he was not concerned that the site would be included in the moratorium, because it was launched three days before the cut-off date. "We were live and operating before the cut-off and are quite comfortable with proving that," he said.

Gocorp's strategy is based around a series of theme gambling sites, one of which it claims was operating on May 19. *Gocorp* intends to argue that the other theme 'gaming rooms' are part of the one site. Appleby said that until he can check the legislation carefully to establish *Gocorp*'s position, the view that *Gocorp*



will be prevented from operating any services is just supposition. He foresees "no negative impact" from the legislation.

Moving offshore

Appleby agrees with the government's view that consumers need to be protected from online gaming, but argues that a national regulatory approach is the best way to do this. He said that by pursuing a complete ban, the government is encouraging operators and gamblers to use unregulated overseas sites where consumers are unprotected.

"Online regulation is much more severe and far more extensive than land-based regulation," he said, as there is a greater capacity to limit problem gamblers online. According to Appleby, the more stringent regulations proposed for online gambling have also been suggested for land-based regulation.

"I am bemused by the Federal Government's approach," he said. "There is an inevitability to online gambling and I don't believe this will protect consumers. A ban will not meet the government objective to protect the consumer interest."

Fiona Angus & Angus Kidman



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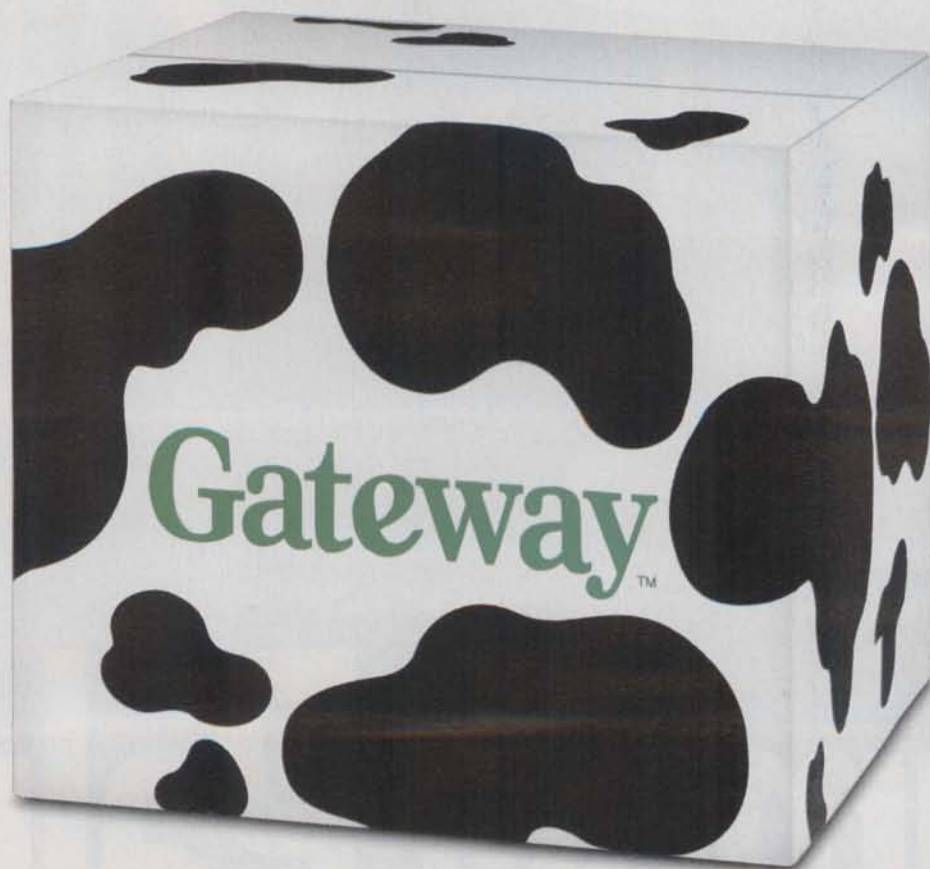
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SPECIAL REPORT

Take a chance on Me

On September 14, Microsoft will release Windows Me, the latest in a long line of primarily consumer-focused operating systems. We've heard the promises before: faster, more stable, more fun to use. Will Windows Me be the OS that delivers, or is it an overpriced minor upgrade? **Alex Kidman** investigates.

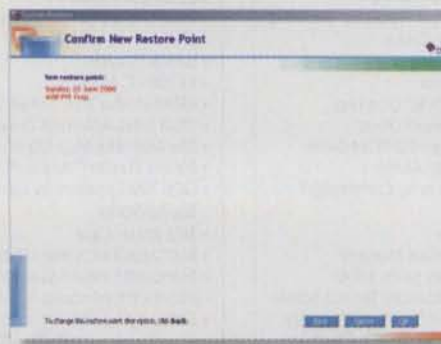
Windows Me is meant to be the last generation of Microsoft's long-running 32-bit Windows 95/98 based products. (The company made the same claim about Windows 98 SE.) The plan is to move to using the Windows NT/2000 core for both business and consumer-based systems. This is reflected in the range of features that Windows Me borrows from Windows 2000, such as the elimination of DOS protected mode and the introduction of Smart Menus. If this is the plan, it's reasonable to ask why anyone would be interested in Windows Me. Microsoft is pegging its hopes for massive consumer uptake on a slightly enhanced feature set and a collection of new applications that are bundled with the OS.

Mamma Me-a

Windows Me is similar to Windows 98. It's the same kind of jump that 98 was from 95: nothing spectacular, and certainly not a new product. At first glance, it would be difficult to notice the difference.

APC examined Release Candidate One (RC1) of Windows Me. Microsoft announced that RC1 was available for review in the same week that it announced that Windows Me had gone into production, so it's likely that RC1 is much the same as the finished product.

From an installation standpoint, not a lot has changed from Windows 98. Both



Windows System Restore in action

OSes share the same installation interface. Installing Windows Me went smoothly, and hardware within our test system was correctly identified. Microsoft has displayed its new installation wizard (called Merlin) at several Windows Me demonstrations, but it was absent from our installation. This may have something to do with choosing a custom installation. In line with the removal of legacy drivers and support, the creation of a boot disk is now a mandatory part of the installation. Without it, there's no way to boot to a command prompt.

Knowing Me, knowing Me

APC has examined betas of Windows Me before (see APC March 2000, page 36). The two features that had been implemented were the file protection system and the removal of real mode support. Not a lot has changed in the RC1 version. Windows, for example, still goes to some pains to protect itself from crashing.

In terms of real mode and legacy support, APC tested a few of what will no doubt be the most commonly run legacy applications: old games. Our experiences were mixed. Doom ran without a glitch, whereas Duke Nukem 3D, which relies on legacy mouse and sound drivers, ran silently and only via keyboard. DOS Civilization ran, but at about one-tenth the

speed we expected. Microsoft claims that a lot of DOS applications will run, but there are no guarantees, and our results back that up. One odd legacy problem was that when we attempted to install drivers for the Microsoft IntelliMouse Explorer, Windows Me warned us that the program 'probably wouldn't run', although it did without any hiccups. Fortunately, there was an option to turn off the warning.

The file protection utility sounded neat, so we put it to the test by deliberately deleting a group of DLL files from the Windows/System directory. We were pleasantly surprised to find that replacements for the deleted files appeared a few seconds after we deleted them. This utility no doubt owes its speed to the fact that all Windows CAB files are copied as part of the install. This is an odd move for Microsoft, as it makes the software much easier to pirate. It certainly allows computer shops to install Windows onto consumer machines without providing the CDs. (Microsoft itself has encouraged this with some OEMs.)

Backing up both utilities is the System Restore feature, which mimics the functions of many other restore features. When we tested System Restore, everything went smoothly; registry entries quickly restored to previous functions, and programs that had ceased working, mainly due to our deliberate fiddling, also restored nicely. The downside is that System Restore reserves between 200 and 400M of hard disk space, expanding the program footprint.

Rock Me

After the US Department of Justice's ruling against Microsoft (see page 28), you'd expect Microsoft to lay low on the integration front for a while, but Windows Me bundles as much software as possible.

Naturally, Internet Explorer is a mandatory install component, and in this case it's Internet Explorer 5.5



The basic Windows desktop hasn't changed much.

(reviewed in APC February 2000, page 38). Chat clients are handled with the Microsoft Messenger package.

In addition to the browser, Microsoft has improved the Media Player to expand its appeal. It's not enough to simply feature a CD player any more, so release 7 of Media Player includes album track listings, some seriously wacky skins and the option to stream Internet content. Media Player isn't a bad alternative to RealPlayer or Winamp, and by including it, Microsoft will attract a larger market share than those who get the OS bundled with a new PC. However, it's unlikely Windows Media Format (WMF) will replace MP3 as a file format.

In our tests, Media Player worked well, although its track coverage paled in comparison to that of CDDB. Users can record

Gimme, gimme, gimme

While Windows Me may be a good option for new machines, it's difficult to recommend as an upgrade. If you're already running Windows 98, it's a little costly. Also, there are alternatives, especially for components aimed at a consumer market. Here are some Microsoft and non-Microsoft alternatives for most of the Windows Me improvements.

Component	Free Microsoft alternative	Free non-Microsoft alternative
Internet Explorer 5.5	Download it from Microsoft	Netscape Communicator
Windows Media Player 7	Download it from Microsoft	Winamp, RealPlayer
Windows games	Play them online	Mplayer or shareware alternatives

This leaves Windows Movie Maker, file protection and the removal of legacy support to tempt you to buy Windows Me. No, we're not convinced either.



Windows Media Player incorporates some unusual skins.

CDs to WMF, which Microsoft claims creates files half the size of comparable MP3s. There's only a grain of truth to this. If you record to the smaller file size, there is a noticeable drop in sound quality.

Microsoft has promised easier digital photo handling, video editing and distribution, and enhanced gameplay features as part of Windows Me. Windows Movie

Maker is a new tool, competing directly with easy-to-use tools such as Apple's iMovie. You're unlikely to create the next *Blair Witch Project* using Movie Maker, but it's solid enough for very simple video editing.

Windows Me includes a new(ish) set of games, centred around Microsoft's own set of Internet-based card games. Fans of Windows 3.11, who know the simple fun that can be had with networked Hearts, will be thrilled to see that the card game has reappeared, along with Pinball, Backgammon, Checkers, and the obligatory Minesweeper and Solitaire.

An area that concerns a lot of new computer users is the Help interface, and for a long time Microsoft has been keen to promote the effectiveness of its help system. The new hook in Windows Me is the Help Center, which collects Help files from all products. It's not a bad idea, but it doesn't address the main problem: help files are often hard to understand, not hard to find.

Microsoft also claims that error messages have been simplified, but on the one or two occasions the system did crash, it was back to blue screens and unintelligible hex dumps.

The Windows takes it all

With only a handful of new features, the case for upgrading to Windows Me is a weak one, especially given the price (see 'Money, money, money' right) Windows Me will almost certainly feature on new machines, and Microsoft seems keen to keep OEMs

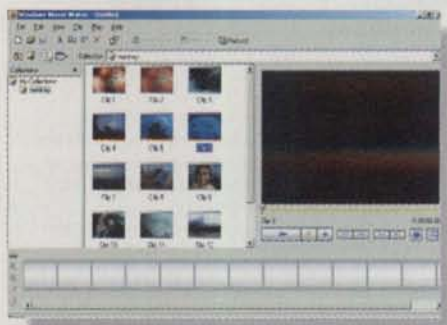
happy. It isn't giving up the splash screen yet, but there are other embedded features for OEMs. They can extend the Windows setup process for new installs to include custom hardware or software, and the new model for Windows Help also has the potential for OEM enhancement.

Rather than being startlingly new, Windows Me is clearly only one step removed from the existing OS, but there are some features that promise to support upcoming technologies. Windows Me offers fast booting for motherboards that support it, which is currently very few indeed. It also supports Universal Plug and Play devices (not yet available in Australia) and DirectPlay Voice for games, a technology that, so far, is only offered by Microsoft. These technologies do hold promise, and will become at least semi-standard in the near future.

Money, money, money

Windows Me would only be a worthwhile upgrade if it was the same price as the Windows 98 SE upgrade. However, Microsoft decided otherwise: its recently released prices put the upgrade version at just over \$200, which is an awful lot for a minor upgrade.

At full price, you can expect to pay around \$380. Of course, the full price isn't that different from Windows 2000, which has even better file stability and the same no-DOS attitude. Windows Me will probably appeal to first-time PC users, and presumably gamers. Ultimately, it's difficult to recommend an OS that has no upgrade path, especially when there are better alternatives. ■



Windows Movie Maker: your chance to become spiel.berg

3dfx Voodoo5 5500

The development of new 3D graphics technology is taking some interesting turns. The technology changes quickly and a new graphics chip can shoot to top position on the 3D leader board, only to be deposed by a new entrant within a matter of weeks or months.

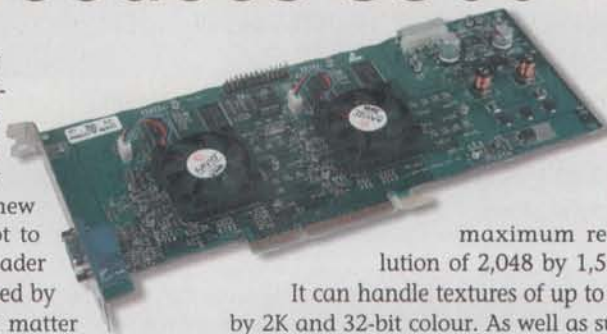
nVidia's GeForce and GeForce2 GTS chips have dominated recently because they contain an internal transform and lighting (T&L) engine, which takes the processing load for T&L calculations away from the system's CPU. 3dfx argues that, for the moment, there is not enough support in games and 3D APIs to justify the extra cost of including a T&L engine in its graphics adaptors.

Instead, 3dfx has decided to use two processing chips on the new Voodoo5 5500 graphics card, an approach that was also taken by ATI for its Rage Fury MAXX card. The Rage Fury MAXX uses two processors to render alternate frames, but the Voodoo5 uses a technique called scan line interleave (SLI), which it developed in the Voodoo2 graphics card. SLI uses two processors to render alternate lines within the same frame, and then puts the composite picture together afterwards.

The Voodoo5 5500 features two VSA-100 graphics processors, each with 32M of SGRAM. To fit all this in, the Voodoo5 5500 is a very big card, and to power it all, it needs to be hooked directly into the power supply with a spare power cable similar to a hard disk drive. Make sure you have one spare, or buy a double adaptor.

The VSA-100 graphics processor chip (VSA stands for Voodoo Scalable Architecture) is designed to work in multi-chip configurations. It's scalable in the sense that if more processing is required, more chips can be built into the same graphics adaptor. There are plans for a four-chip version of the Voodoo5 with 128M of memory.

3dfx says the card can process 366 million pixels per second, or 11 million triangles per second. It has a 350MHz RAMDAC, as do all its current competitors, and a



maximum resolution of 2,048 by 1,536.

It can handle textures of up to 2K by 2K and 32-bit colour. As well as supporting the DXTC texture compression used by DirectX, the Voodoo5 5500 also uses its own texture compression algorithm called FXT1, which gives an effective compression ratio of 8:1.

Image quality has improved and games now have a more cinematic feel. T-buffer technology allows full scene anti-aliasing (FSAA), spatial anti-aliasing, motion blur and depth of field. 3dfx claims the VSA-100 chip can perform FSAA without a noticeable performance hit. Reviews on game enthusiast sites such as Kick Ass Gear have shown that FSAA can degrade performance quite noticeably at high resolutions.

APC tested the Voodoo5 5500 using the same Dell 800MHz Pentium III machine used in the graphics card tests last month (see APC July, page 98). 3dfx recently recalled large batches of the alpha release version of the Voodoo5, and based on our test results, it's not hard to see why.

The performance of the alpha Voodoo5 5500 that APC examined was uninspiring, and clearly not up to the standard of its competitor, the GeForce 2 GTS. If compared with the graphics cards we tested last month, it would have fallen somewhere mid-field for most tests. It scored poorly in the video tests, lagging well behind the field in two of the three categories of the Video2000 test. It also scored very poorly in TreeMark, but this benchmark uses very complex polygon figures, and is specifically designed to show off the T&L capabilities of the GeForce.

Hopefully, the alpha card recall will see the Voodoo5 improve considerably. The current card is hard to recommend.

Josh Mehlman

Product	Voodoo5 5500
Contact	Innovision
Phone	(03) 9817 7988
Online	http://www.3dfx.com/
Price	\$799

Specifications	
Graphics processor	Two 3dfx VSA-100
Video memory	64M SGRAM
Processor speed	166MHz
Maximum resolution/colour depth/refresh	2,048 by 1,536/32 bit/75Hz
Maximum 3D resolution/colour depth/refresh rate	1,600 by 1,200/32 bit/100Hz
RAMDAC speed	350MHz
AGP type	4x
VGA 15-pin	Yes
S-Video (PAL/NTSC)	No
VR (for glasses)	No
RCA (composite PAL/NTSC)	No
BNC	No
DDC (digital)	No
Dual monitor support (hardware)	No
Platforms supported	Windows 95/98

Benchmark Results	
3D WinBench 2000	69.2
Business Graphics WinMark 99	342
High-End Graphics WinMark 99	898
3DMark2000	4,119
Video2000: overall score	1,816
Video2000: quality	516
Video2000: performance	749
Video2000: features	552
Expendable lowest/average fps	44/71
Quake III Arena 1,024 by 768 at 16 bits	84.8
TreeMark simple/complex fps	3.2/3/2
viewperf: DX-05	4
viewperf: AWADV5-03	15.6
viewperf: DRV-06	4.7

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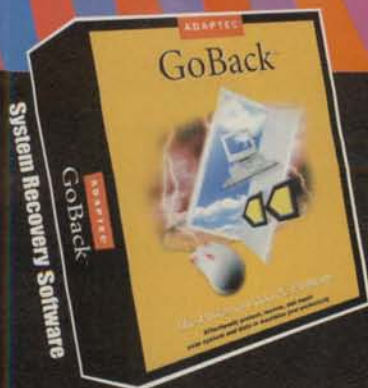
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Platypus Technology QikCACHE8

If you've pushed your servers or workstations to the limit as far as RAM and processors go, and still aren't getting the performance you need, then QikCACHE8 could answer your prayers. It's not for the casual home user, but for the high-end workstation/server market.

In its purest form, the QikCACHE8 is a PCI expansion card with eight RAM slots used for system caching. It's a simple idea and one that works well. The slots can take any 168-pin SDRAM DIMMs from 256M up to 1G. (Platypus Technology does not sell base cards without RAM.) With eight slots, you can configure the QikCACHE8 from a minimum of 512M to an extra 8G.

As the workstation version (QikCACHE2) was not available at the time of review, APC tested the server version of the product. Platypus Technology claims they both run at the same speed and produce similar results. In addition, physical differences are not great; other than QikCACHE2's shorter PCB, which won't stretch right across the casing, it has only two RAM slots (256M to 2G). The workstation version should be available by the time you read this.

APC tested QikCACHE8 on an 800MHz Pentium III system with 128M of base RAM and a 27G hard drive. It's important to note that most of the benchmarks used do not normally push a system to its limits. Setting up the card is easy; take the QikCACHE8 and plug it into a free PCI slot that has room to accommodate the card (the larger server card we tested easily fitted into the normal PC case). Platypus also bundles the card with an antistatic strap, which is a small but important touch.

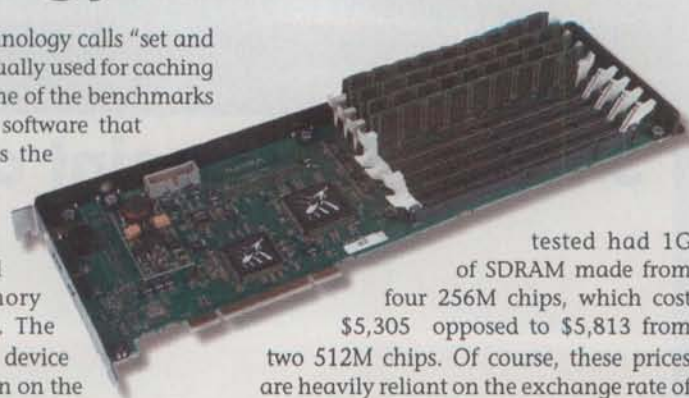
Our benchmarks run under Windows 98, and the card has drivers for this OS, along with Windows 95, NT 4.0 and 2000, and Red Hat 6.0 with Linux kernel 2.2.5. Once the card and the drivers are installed, you need to run fdisk, create a partition for the memory on the QikCACHE8, then format it. Because QikCACHE8 works as a separate hard drive for caching operations (for instance, under a Windows configuration the QikCACHE8 drive is used as the volume where the Windows virtual memory files are kept), it can be treated as such only when the system is fully booted.

When the machine boots up, the QikCACHE8 card is enabled, and the drivers repartition and reformat the memory. This

is what Platypus Technology calls "set and forget". The card is usually used for caching only, but APC ran some of the benchmarks off it to test custom software that specifically addresses the QikCACHE8 card.

APC tested the system both with QikCACHE8 enabled as the virtual memory drive, and disabled. The disk tests, while the device was disabled, were run on the hard disk. When enabled, they were run on the Platypus' virtual drive. The difference in access speed was staggering. If used in lieu of a hard disk, the Platypus delivers data at around six times faster than a hard drive.

If you're running high-end server or workstation applications, QikCACHE8 could be what you're looking for. The prices vary for different QikCACHE8 configurations. For instance, the card we



tested had 1G of SDRAM made from four 256M chips, which cost \$5,305 opposed to \$5,813 from two 512M chips. Of course, these prices are heavily reliant on the exchange rate of the Australian dollar and RAM prices.

Darren Ellis

Contact	Platypus Technology
Phone	(02) 9460 6860
Online	http://www.platypustechnology.com.au/
Price	\$5,305
In short	A great idea for the high-end market, but too expensive for most needs.

Test system	Dell Dimension 800B	
Specifications		
Processor	Pentium III 800MHz	
Secondary cache	256K	
RAM and type (maximum)	128M SDRAM (384M)	
Hard disk	20.4G Ultra ATA/66	
Hard disk controller	Intel 82801AA bus master	
Hard disk file system	FAT32	
Graphics card	nVidia GeForce 256 DDR	
Video bus type	AGP	
Video RAM	64M SDRAM	
Video controller chip	nVidia GeForce 256	
Graphics driver name and version	NVDISP.DRV 4.12.01.0375	
Tested resolution/colour depth/refresh rate	1,024 by 768/16 bit/85Hz	
CD/DVD-ROM drive	8x DVD	
Soundcard	Sound Blaster Live	
Benchmark results		
	QikCACHE8 disabled	QikCACHE8 enabled
SYSMark2000: overall score	162	163
SYSMark2000: Internet content creation	165	167
SYSMark2000: Office productivity	159	160
Business Disk WinMark 99	4,030	24,000
High-End Disk WinMark 99	13,000	81,500
Business Graphics WinMark 99	355	356
High-End Graphics WinMark 99	1,000	1,000
Business Winstone 99	27.6	30.9

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Inspiration becomes reality.™

IBM ThinkPad T20

IBM has recently revamped its range of notebooks. Instead of the confusing number system it formerly used, IBM has switched to two product lines: the A series of desktop replacement machines, and the T series of powerful, portable notebooks for people on the move. APC looked at the ThinkPad T20, which developed directly from the ThinkPad 600X, reviewed in April (see APC April, page 36).

IBM has reworked its entire range so that docking stations, power supplies, swappable drives and memory are all interchangeable between different models. This seems an obvious step, but surprisingly few manufacturers do it.

All IBM notebooks now have a small light, which shines from the top of the display onto the keyboard, for those working in low light conditions such as a plane at night. While extremely effective in complete darkness, it made little difference in low light conditions. Using this light for long periods of time probably impacts on battery life, but we were unable to test this conclusively.

The notebooks also have four extra buttons: a help button and volume controls. The power switch has been relocated from the side of the notebook to just above the keyboard.

The T20's case is a tough titanium composite in standard IBM black. It has a connector called an UltraPort on the top edge of the display. The UltraPort is in a very convenient location to attach peripherals, but currently the only one available is a small camera for videoconferencing. IBM claims a fingerprint scanner and other useful add-ons will be available by the end of the year. Since it's a relatively small market, and no other notebook manufacturer will be using the UltraPort standard, it's unlikely there will be a wide range of these devices available, and almost certainly not from third-party manufacturers.

APC looked at the higher end T20, which has a 700MHz SpeedStep Mobile Pentium III processor, a 14in display, a 12G hard disk drive and a 6x DVD-ROM drive. The other model has a 650MHz processor, a 13in display, a 6G hard disk drive and a 24x CD-ROM drive. Both come with 128M of memory and a Savage IX8 graphics chip with 8M of SGRAM. The T20 isn't so light you can juggle with it, but it's portable at 2.4kg (without the power pack).

In performance terms, the T20, in almost every respect, is the most powerful notebook that APC has looked at. With the exception of disk tests, the ThinkPad T20 outperformed both the Dell Inspiron 3800 and the Gateway Solo 2150 APC reviewed in June (see APC June, page 44). The T20's scores in the Ziff-Davis Business Disk WinMark 99 test were a little lower than those of the Gateway and Dell notebooks, but it beat both the Dell and Gateway notebooks in Business Winstone 99.

Running the notebook in battery-optimised mode, which switches the processor speed down to 500MHz, gave the T20 an extra 25 minutes of battery life. In optimised mode, the notebook lasted just under three-and-a-half hours, which is impressive, but not exceptional.

Josh Mehlman

Product	IBM ThinkPad T20
Contact	IBM
Phone number	13 24 26
Online	http://www.ibm.com.au/
Price	\$7,510
Warranty	3 years

Specifications

Processor	Intel Pentium III 700MHz
Secondary cache	256K
RAM and type (maximum)	128M SDRAM (512M max)
Hard disk drive and type	12G EIDE
Hard disk controller	Intel 82731AB/EB PCI bus master
Hard disk file system	FAT32
Video bus type	AGP
Video RAM	8M SGRAM
Video controller chip	S3 Savage IX8
Pointer device	Trackpoint
Dimensions (h by w by d)	3.3 by 30 by 25cm
Bare minimum weight	2.4kg
PC Card slot type	Two Type II or one Type III
Port replicator available	Yes
Docking station available	Yes
CD-ROM drive/DVD	6x DVD
Soundcard	Crystal SoundFusion
Internal modem	V.90
Display	14.1in TFT
Maximum resolution (internal/external)	1,024 by 768/1,024 by 768
Battery type and rated battery life	Lithium ion
OS available	Windows 95, Windows 98, Windows NT 4.0, Windows 2000 Pro, OS/2 Warp 4

Expansion slots

Carry case included in price	No
Software and accessories	Utilities

Benchmark results

CPUmark99	63.2
FPU WinMark	3,710
Business Disk WinMark 99	2,143
High-End Disk WinMark 99	8,100
Business Graphics WinMark 99	203
High-End Graphics WinMark 99	583
Business Winstone 99	27.4
SYSMark2000	134
BatteryMark: battery rundown time (hours: minutes)	Maximum performance mode 3:00, battery-optimised mode 3:25

The products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated. All specification details are submitted by the vendor and APC accepts no responsibility for any errors within.

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These tests were performed without independent verification by Ziff-Davis and Ziff-Davis does makes no representation as to the results.

To test the battery we had APM enabled on all notebooks. All power-saving features were disabled.

Notebooks require an internal resolution of 1,024 by 768 to run these tests.





The works without the works.

This Panasonic digital LCD monitor may be slim, but its 19" viewable screen is one of the biggest available.

Yet the LC90S's tiny footprint means you can have all the advantages of a big screen on a small desk.

The LC90S is only a fraction the depth of a 21" CRT monitor with almost the same viewable area. (Which begs the question, why buy a CRT when you can buy an LCD this slim?)

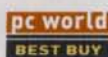


You also get the benefits of built-in bass reflex speakers, a 6 port USB hub, dual VGA inputs and compliance with the latest emissions and environmental standards.

The LC90S has superior image clarity and resolution plus a viewing angle of 160° (the best in the industry). And the LC90S is part of a range as wide as its screen. LCDs come in either 15" or 19" with a 23" screen on the way.

We don't stop there. Panasonic makes award-winning CRTs in 17", 19" and 21" in a choice of entry level or professional, flat screen or short length.

Surprised? Don't be. Panasonic is one of the world's largest monitor manufacturers.



Panasonic

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APC Mag. Editor's Choice Highly Commended award: SL 95 • PC World Best Buy awards: PF 90, E 50i, LC 50S, S 50i • PC Magazine Editor's Choice award: PF 90 • PC Authority Value award: S 110i

Swift & Ulin PA XV (Aust. Personal Computer)

Logitech Cordless TrackMan Wheel

If you're looking for weird and wacky pointing devices, Logitech might be able to oblige with its cordless variant of its TrackMan Wheel mouse.

A thumb-scrolling trackball, the Cordless TrackMan Wheel uses radio technology so you don't have to point the device at an infra-red receiver. As long as the Wheel is within about 2m of the reception box (which plugs directly into the PS/2 or USB port), it works.



Like all trackballs, it requires some getting used to. Fine control with the thumb takes time to master — first you have to get over the desire to slide the TrackMan around your desk.

On the default settings, you can almost go the width of the screen without lifting your thumb off the trackball. Most of the time it can be moved smoothly, but certain actions are jerky, as you need to lift your thumb and re-centre it. The instances where this matters are few, but it might make a difference in some games and illustration programs.

One major disadvantage of the device is its handed-ness (like most pointing devices these days). The device APC looked at was for right-handed people only (unless you fancy trying to move the trackball with a pinkie). Logitech sells left-handed versions, but these may be harder to find in shops.

To your PC, the TrackMan appears as a PS/2 mouse, so technically no drivers are needed to install the device. However, Logitech's MouseWare provides some useful —

and not so useful — extras. For instance, it provides button configuration, so you can swap the buttons around if you desire. There's also a battery-life meter and tools for configuring sensitivity.

The latest version of the software also includes a tool called WebWheel, which is designed to control browser operations with a click of the third button/scroll wheel. A pie-selection tool appears and you can choose options such as back, forward and reload. WebWheel's utility is dubious: it doesn't seem to be any quicker than normal browser operation.

The TrackMan Wheel is a nifty device, but if cordlessness doesn't matter to you, we'd recommend the Logitech TrackMan Marble FX as a superior trackball.

Nathan Taylor

Contact	Logitech
Phone	(02) 9972 3711
Online	http://www.logitech.com/
Price	\$179
In short	A neat, cordless trackball, but the Marble FX is better.

Canon BJC-8200

The Canon BJC-8200 is ideally suited to those wanting to add a professional touch to their photo printing, for the price of an inkjet printer.

The BJC-8200 offers you the choice of printing in a standard four-colour format for document printing, or switching to six-colour photo printing without the need to add or remove cartridges from the print head. The head is large enough to accommodate all six ink tanks. You simply select the appropriate print format for each job using the driver functions. There are also ink level detectors which are useful for large colour printing jobs.

The printer interface operates on either a parallel or USB interface and the installation CD contains drivers for both Windows 95 and 98. APC tested the printer using the USB connection, and downloaded the appropriate driver for a system running Windows 2000 from Canon's Web site. Both the download and installation were trouble-free thanks to the simple instruction guide that accompanied the driver. The print head

alignment process following installation is standard, and was completed in virtually no time.

The BJC-8200 has a maximum resolution of 1,200dpi and two image-enhancing features are built into the driver to produce professional-quality photo printing. Photo Optimiser adjusts the image for better print quality without altering the original image file, while the Image Optimiser feature enhances low-resolution files to reduce jagged edges and faded colours.

There are also special effects printing capabilities installed into the driver. These allow you to convert a photograph into a simulated illustration, or convert full-colour images into monochrome sepia tones with one click. Needless to say, the effects are not as spectacular as those in a specialised graphics package, but they are helpful for one-off photo adjustments at no extra cost.

The time taken to complete a full-colour photo image was three minutes 10 seconds, which is considerably faster



than others we have seen. In addition, the printer is very quiet. Canon boasts that the BJC-8200 is the first to achieve a reading of less than 40dB (37dB, to be precise).

As with many other printers in Canon's Bubble Jet range, the BJC-8200 offers an optional 600dpi scanning head. The scanner cartridge costs an additional \$199 (est).

Fiona Williams

Contact	Canon
Phone	(02) 9805 2570
Online	http://www.canon.com.au/
Price	\$749 (est)
In short	Professional-quality photo printing with interesting additional features.

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PACOMMAN

NEC Versa Note VX

Instead of catering to the needs of the high-end portable computing market, NEC seems to be making a concerted effort to win over MIS fleet purchasing officers with its Versa Note VX.

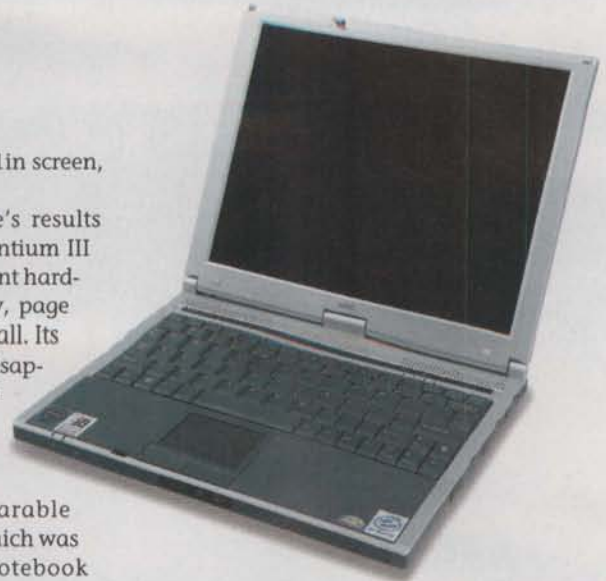
This isn't a first for NEC product development. Its usual approach involves manufacturing customisable notebooks with medium to high-end specifications. The Versa Note is available in a range of specifications, is priced reasonably for volume purchases and has security features that make it an excellent choice for corporate users.

The review unit that was sent to APC contained the highest Versa Note specification available. With an Intel Pentium

III 500MHz processor and a 14.1in screen, it is priced at \$4,529.

Comparing the Versa Note's results with those returned by other Pentium III 500MHz notebooks in APC's recent hardware reviews (see APC February, page 84), it's hard to fault the unit at all. Its graphics results were the only disappointment; while it can handle a PowerPoint presentation, it's not up to playing games such as Quake III.

The unit achieved comparable results to the NEC's Versa LX, which was reviewed in February's notebook roundup. The LX was praised for consistently achieving results at, or near, the top



of those returned by the group as whole, but it was criticised for its high price (it's almost double the price of the Versa Note).

Most of the Versa Note's features are standard or a little better, and its RCA video port is a bonus for a unit of this price. In fact, if it weren't for the lack of an Ethernet port on the chassis, it would be the perfect corporate fleet notebook. It does have a built-in Ethernet controller, but you need to dock the unit to a PortBar to access it.

The Versa Note has a feature that is bound to please corporate security officers. Built in to its chassis is an extra strip of numbered keys that's designed to be used as a PIN input pad for a BIOS security feature. When this feature is active, the notebook's user must enter their PIN before they can turn the machine on or revive it from a suspended state. When the machine is switched on, the input pad can be used as extra function keys. This probably won't prevent the machine being stolen (there is a Kensington lock port for that), but it does make it safer for data security.

The unit's glidepad and key positioning were slightly problematic. Faster typists with longer than average fingers may find that their thumbs brush against the glidepad's sensitive surface from time to time, effecting a mousedown wherever the pointer is located at the time. If you're typing in Microsoft Word, the cursor may jump to another point in the text before you stop typing. Imagine what could happen if the pointer was over a toolbar button.

This is annoying, but not enough to undermine the value of the Versa Note as a whole. Its impressive performance, reasonable price and feature set make it a very good choice for a corporate fleet purchase.

Andrew Colley

Product	Versa Note VX
Contact	NEC Computers Australia
Phone	1800 632 777
Online	http://www.necca.com.au/
Price	\$4,529
Warranty	1 year RTB (3 years RTB available)
Specifications	
Processor	Intel Pentium III 500MHz
RAM and type (max)	64M SDRAM (256M max)
Hard disk drive	12G (removable)
Hard disk controller	Intel 82440MX PCI bus master IDE
Video bus type	PCI
Video RAM	4M SDRAM
Video controller chip	Rage Mobility-M PCI
Pointer device	Glidepad
Dimensions (h by w by d)	31 by 25 by 4cm
Bare minimum weight	2.8kg
PC Card slot type	One Type III or two Type II
CD-ROM drive	TEAC CD-224E
Soundcard	Yamaha AC-XG
Display	14.1in XGA TFT
Maximum internal resolution (64K)	1,024 by 768
Battery type and life	7 cell Lithium ion, 3.17 hours
System BIOS information	American Megatrends
Expansion slots	2x USB, 1x serial, 1x parallel, 1x PS/2, 1x VGA, 1x infra-red, 1x RCA TV out (PAL), 2x PCMCIA
Network	56K internal modem (10/100 Ethernet controller available when connected to NEC PortBar with RJ45 connector)
OS available	Windows 95/98/NT 4.0
Docking station available	No
Port replicator (PortBar)	\$303
Carry case included	No
Benchmark results	
CPUmark 99	46.3
FPU WinMark 99	2,660
High-End Disk WinMark 99	8,560
Business Disk WinMark 99	2,920
Business Graphics WinMark 99	104
High-End Graphics WinMark 99	344
Business Winstone 99	18.9
SYSMark2000	86

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BCN Technology

www.bcntech.com.au
sales@bcntech.com.au

TerraTec phono PreAmp

Music on PCs is a good thing — it's portable and no-one steals CDs from your desk. However, if your collection includes music that hasn't been mastered to CD, your options are limited. You can transfer LPs and tapes to PC audio formats, but not without the appropriate technology (and the proper copyright approvals). One vital piece of equipment is a pre-amplifier to increase the signal presented by most record players. If you already have an amp, chances are you're set. But for those of you who aren't prepared to purchase an amplifier just for that one task, there's TerraTec's phono PreAmp.

The PreAmp looks like a standard passthrough box. It plugs into the game port (for power) and the line-in of most soundcards, using the line-in socket. From there it runs out to two RCA input connectors and a game port replicator. There are also switches for output modulation and amplification.

PreAmp's packaging indicates that it's all you need for computer-based LP recording, but this isn't the case. PreAmp lacks

decent recording software. It is possible to use Windows Sound Recorder, for example, but you'll end up with relatively poor-quality files. The documentation does point you towards some manufacturers of sound engineering software, but the inclusion of these packages would make the PreAmp a much more attractive proposition.

One thing to check is whether the record player being used has any level of amplification itself, as is common with many players bundled as all-in-one (tape/LP/CD) units. APC's first test record player did, and the sound results were less than impressive. It's also worth switching to a very good-quality player with a good needle if you want CD-quality sound and fewer distortions.

The only other caveat with PreAmp is that you'll need to move the record player near your system, as the cables are only about 50cm in length. That aside, we were able to record samples from LPs with a minimum of fuss. Samples compared



extremely well with their CD-mastered counterparts, apart from the odd click and pop, which is more a function of the quality of the LP and needle than Pre-

Amp. (For more information on recording LPs to CD, and capturing sound in general, see APC February, page 115).

Alex Kidman

Contact

Phone

Online

Price

In short

Innovision

(03) 9817 7988

<http://www.terratec.net>

\$199

An easy way to transfer music from any LP to computer format.

Adaptec GoBack 2.2

You've just done something stupid. Deleted a vital folder, saved an empty spreadsheet over next year's budget, clicked on that ILOVEYOU.TXT .VBS file in your email, or installed a new soundcard that keeps on crashing your system. Perhaps if you had backed up more regularly, you might be able to fix the problem, but who can be bothered keeping regular backups?

Thankfully, when Wildfire developed a program called GoBack — which keeps backups of all the changes made to a hard disk in real time — Adaptec liked it so much it bought the company.

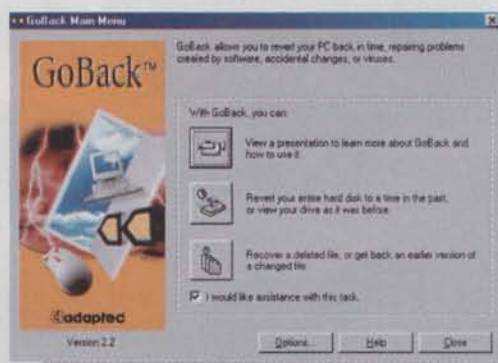
GoBack takes up a section of the hard disk, which is set to 10% by default. It uses this section to store a compressed image of the data on the hard disk. This section can not be viewed or modified by the operating system. As changes are made to files on the disk, GoBack stores the changes in its compressed backup, as well as making a chronological log of all the changes.

This allows users to correct any changes, even after accidentally formatting the entire hard disk. Just select the date and time you

want to wind back to, and click. If you have saved over an old version of a file, GoBack allows you to restore it.

GoBack is very easy to use. The installation takes about 15 to 20 minutes, while GoBack makes an image of your hard disk, but after that it works in the background. However, as it runs consistently, even when the computer is idle, it can make your hard drive rather noisy. This can quickly become annoying.

Adaptec claims GoBack's impact on performance is negligible. To test this out, we ran the same benchmarks before and after installing GoBack. GoBack downgraded the score in Ziff-Davis Business Winstone 99 by about 5%, and High-End Disk WinMark 99 by about 20%. These benchmarks work the disk a lot harder than just about any application, so it's unlikely that the impact on performance would be this severe under most circumstances. For multimedia applications such as those used for creating video and sound files, it might make a noticeable difference.



GoBack currently works on Windows 95 and 98, and Adaptec says it will work just as well on Windows Millennium. An enterprise edition due for release later in the year will work with Windows NT and Windows 2000.

Josh Mehlman

Contact

Phone

Online

Price

In short

Adaptec

(02) 9146 0687

<http://www.adaptec.com/>

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Magical disappearing censorship laws

Huh? You mean this censorship thing actually *did* happen? The article, 'Burning the censors' (see APC July, page 84) has confused me beyond belief.

In the lead-up to the censorship law (which took effect on January 1, 2000), I was worried. I couldn't find anything that explained what was happening written in plain English. I saw no changes to popular ISPs' home pages, no change in Internet speed, and no articles about it in magazines or papers. I even emailed many ISPs

BURNING THE CENSORS



asking for the latest information they had on the law and what steps they were taking to abide by it. The general response was 'we haven't been told what needs to be done yet, so we haven't done anything.' I was pretty sure the whole idea had fizzled.

Now I find out (almost half a year after it came into being) that the law was enacted. If nobody knew what was happening with it (especially the ISPs), how were they meant to act on it? If people see a site that offends them, how are they to know they have to send a complaint to the ABA? And where do they send the complaint?

Your article states that ISPs are meant to provide information about the law, and about obtaining filtering software for home computers. I only saw this sort of information start to pop up around March. I still look upon this whole censor-

ship thing as stupid, but now it's a different sort of stupidity to the kind I expected.

Name withheld
Cammeray, NSW

Breaking up is hard to do

An article in a recent issue of APC (the April issue, I think) suggested that breaking Microsoft up would be a bad move as there is nothing to take its place. This is true, but something should be done.

Microsoft should be forced to open the Windows source code. It could still maintain control, but other software companies could use it as a base for their own OSes, thereby opening up competition.

I think the OS should have application software built in, such as Internet Explorer and Office. If Windows was open source, this could be done without smothering the competition. Sun could bring out a version of Windows with StarOffice and Sun's own browser built in, and it would still be compatible with other Windows software.

If enough people email petitions to Microsoft, maybe it will take up the idea.

Robert Smit
Internet

Ed note: We're guessing that the article Robert was referring to was a reader letter under the heading 'Defending Microsoft', on page 52 of the April issue.

The contentious issue is not Microsoft's exclusive right to sell its operating system (which it clearly has and will never give up), but the access of other developers to that operating system. The theory goes that Microsoft's own non-OS products have an advantage because its developers have access to the Windows source code. If everybody else has equal access, then the playing field would be even.

It's extremely unlikely that Microsoft would go open source the way Linux is open source.

Billy Gates Gruff

I'm sick to death of hearing Billy Gates Gruff bleat about what a loss it will be to the world of innovation if Microsoft gets split up! What innovation? Microsoft is famous for acquisition, not innovation. It originates very little of its own software.

THREADS

from APC's Web sites

A general sense of bitterness over our government's inability to deal with technology issues has had another airing on our boards in recent months. The latest target: datacasting.

Poster P Jones best summed up the topic with this comment:

I guess the government is so buoyed by its recent huge 'success' with the Internet censorship legislation that it's now hunting for more prey to hang over the fireplace. It's another spectacular failure from Senator Alston in the making, and should provide for some good entertainment along the way. Isn't it comforting to know that our wonderful e-industry is in the hands of such capable and awe-inspiring people?

Discussion contributor Joel became so depressed about the issue that he threatened to expatriate himself:

The saddest thing is I am utterly convinced that our government is not even *trying* to understand the technology it is dealing with. It almost makes me want to leave the country and not come back.

Frequent Newswire Sounding Board visitor Robert Walker asked whether the whole point was moot, in light of the recent developments in Netcasting:

With all the fuss about the ridiculous laws before the Senate at the moment, what is the future of datacasting, as compared to high-bandwidth Internet broadcasting? Will they coexist?

More than one respondent expressed concern that the government would also step in and (try to) regulate the broadcasting of material over the Internet — all in the interests of the Australian public, of course.

This from an anonymous poster:
My money's on high-bandwidth Internet broadcasting being the standard. Datacasting seems fraught with government interference and red tape. Now we see that our 'IT cluey' government is trying to control Internet broadcasting via ADSL, cable, satellite and so on by trying to incorporate it into it's "highly successful" (cough, cough) datacasting legislation. What a bloody joke!

Want to put across your view, or see what other readers have to say? Join the discussion at <http://apcmag.com/interactive/>.

Microsoft sees a successful product and uses market pressure to make the real innovators 'an offer they can't refuse'.

Microsoft's version of a Windowing interface was released 11 years after Xerox pioneered the concept and well back in the queue, after Apple (who did it twice!), Digital Research, Commodore and Texas Instruments. In fact, by the time Microsoft got around to 'inventing' Windows, it was a well-established, time-proven concept.

But, no, I tell a lie — Microsoft has produced one outstanding innovation: the operating system that automatically runs programs that arrive from untrustworthy external sources. Surely no other operating system in the entire world permits a simple, childish script to bring down an entire enterprise system by handing it control without even notifying the operator or asking permission. Now, that's what I call innovation!

Must we thank Microsoft for ANSI bombs, macro viruses, VBScript viruses, and the right to purchase (from them) the repairs to products that weren't fit to market in the first place? With any luck, maybe all that innovation will soon come to an end.

Greg Durkin
 Internet

GST savings (or not)

Australian Personal Computer must be one of the rare publications that readers buy as much for the advertisements as the articles. Each month I pore over those articles that apply to my areas of interest and afterwards 're-spec' my dream machine using the ads, particularly the extensive catalogue-style ads in back.

I was recently within an ace of ordering a new computer to replace my Pentium 150MHz, when I read an article that suggested that there should be savings of up to 17% on computer systems after the GST. Following the advice in the article, I decided to delay my purchase until July. I must be one of the only people who can't wait for the GST introduction, so that I can finally order my new system and rightly relegate my current one to a new role as an anchor.

However, every person I speak to about this says I am kidding myself if I believe that suppliers will pass on the wholesale sales tax savings. It strikes me that this is the ideal time for APC to spec up some computers, and give an industry analysis of what they should cost after the GST's introduction. I for one will be hoping that I haven't been putting up with this 'anchor' for an extra three months for nothing.

Geoff Glanville
 Noosa, Qld

Ed note: Looking at early advertisements, it appears the doubters may have been right in some circumstances. Few advertisers in the July issue even bothered to put the GST-inclusive price. That said, some advertisers put their post-GST hardware prices down. For instance, Victoria's City Software dropped the price of a digital camera from \$285 to \$275. At the same store, the Imation SuperDisk went from \$322 to \$310. However, all software increased in price.

Our advice: shop around. There's a lot of confusion among businesses, but it seems some of the more legitimate ones have delivered lower prices to consumers.

It's Mac time

I've been purchasing APC for the past four or five years and am becoming increasingly disappointed with the Mac software content on the CD. I buy your mag because it has Mac content. None of the Australian Mac magazines carry a CD, and the imported ones are too expensive.

The latest issue has annoyed me enough to comment. I was after the latest Acrobat reader for the Mac, but it's only there for Windoze [sic]. Also, Eudora is there for the PC but not Mac. If this continues, I will be looking for an alternative for the latest 'standard' products.

Name withheld
 Tasmania

Ed note: Apologies to all our Mac-using readers. Eudora and Acrobat for Mac are both on this month's cover CD.

Music to our ears

I enjoyed reading Angus Kidman's 'Calling the tune' (APC July, page 54), and asked myself 'what is my favourite technology-related song?'. It only took a couple of seconds to decide on an excellent song: 'It's All About the Pentiums' by "Weird Al" Yankovic (from his latest album *Running With Scissors*).

The song is a parody of Puff Daddy's 'It's All About the Benjamins', and contains Weird Al's typically clever wit applied to the computer scene. It's extremely entertaining both lyrically and musically; well worth a listen. You can read the lyrics and watch the video online at <http://www.thepentiums.com/>.

Paul Colby
 Internet

Ed note: It's good to see that APC's readers are thinking about the big issues...



Correction

- The dual processor feature review of Alpha Computer AlphaServe Dual650 in APC June included an incorrect phone number for Alpha Computer in the table on page 103. The correct number is (03) 9415 9177, as stated in the review on page 100. We apologise for any confusion this error may have caused.
- The review of ADSL in APC July on page 34 incorrectly stated that Pacific Internet Corporate (PIC) charges 12.9 cents per megabyte for uploads and downloads. PIC does not charge for uploads.

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Angus Kidman

Angus Kidman is editor in chief of APC and Newswire. He can be contacted at akidman@acptech.net. Angus' DisGust column is published Tuesday to Friday every week at <http://newswire.com.au/disgust/>.

An online database that allows you to search through portraits might not sound that innovative — but in the right context it'll blow you away.

Pretty as a picture

If you have a good use for technology and you implement it properly, then people will almost always be impressed. The fact that technology enjoys such a poor reputation in many circles isn't really a reflection on its potential, it's more an indication of what happens when people don't take the time to get it right.

Let me illustrate this with an example. During a recent visit to London, I popped into the National Portrait Gallery (NPG), which has existed since 1856 as a repository for pictures of significant individuals in British history. The NPG's collection now encompasses more than 10,000 paintings, photographs and sculptures, which makes it a significant resource. However, it also poses a significant problem: how the hell can they all be on display at once?

Even with recently completed construction work that has added new display wings, the answer is simple: they can't. The NPG recognised this problem more than a decade ago and pursued what was the obvious solution even then: developing a computer system that allows visitors to browse through scans of the portraits it holds, and information about them.

The recent expansion of the NPG has allowed this facility to be developed into a new IT Gallery. It boasts 10 touchscreen computers running a program known as the Woodward Portrait Explorer (WPE). It holds scans and a wealth of information (25G in total and about 40,000 individual pages) on more than 8,000 people who are represented in its collections.

Running on the Mac G4/450, the WPE system allows you to browse by sitter, by artist or by picture type. You can also view interviews with portrait photographers

discussing their works, or assemble your own interactive map which tells you where in the gallery you can find particular portraits that are on display.

Of course, the idea of storing museum information in a searchable electronic format is not new. What makes the WPE so appealing is the fact that it works so well. The search facility is fast and efficient, the high-quality LCD screens display the portraits brilliantly, and there's a zoom facility for checking out fine details.

Hyperlinking is used efficiently throughout, allowing that still rare experience of searching for one subject and then browsing your way to other information that you might not have expected to be of interest. And the use of touchscreens means no mice or keyboards to break down.

Not every museum succeeds in this way. During my trip, I also visited the London Transport Museum, which tracks the history of London's tube and bus systems. There are numerous touchscreen displays throughout the museum, but they aren't as easy to use or enjoyable.

The day I visited, three weren't working at all, and those that were active required little short of punching to generate a reaction. This fact is acknowledged in the museum's own displays; a section on a day in the life of the museum notes that one of the technical assistants spends much of his time trying to get the aging touchscreen systems to work.

Had this been my only exposure to the use of computer technology in museums, I might well have drawn the conclusion that trying to use PCs to enhance the experience of browsing is a waste of time. Instead, my experience confirmed a strikingly obvious but important idea: if you build something that works properly, everyone is going to like it and use it.

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Jeremy Horey

Jeremy Horey is a senior consultant with Com Tech Online. He can be contacted at jhorey@comtech.com.au.

Will the Internet affect book publishing as much as music publishing?

Digital distribution

The Internet is challenging publishing in all its forms. Napster and its clones are threatening music publishers while ebooks and similar forms of text distribution pose a threat to book publishers.

The music industry's struggle has generated a lot of media coverage. Book publishers face the same issues, but so far, the limitations of the form have protected them from the problems confronting music publishers.

In the early days of the Web it was popular to think that the Internet provided ordinary people with a way to publish their own work. The naïve view was that anyone could publish a book or an article on a Web site. The Internet community would find and promote the good and the useful while the bad and useless would languish unread. We thought that the quality of work and insights provided would be factors that determined success online. We were wrong. As in the offline world, reaching an audience takes more than just good work.

Authors need marketing. Authors need someone to tell people that their work is available and worth reading. The simplest way to do this is to become part of a place where people go to find the sort of thing that the author is offering. It is by banding together that people get their work noticed. However, the hardest thing to get online is attention. It doesn't come just from producing quality material.

A handful of online works have been noticed and success has followed for the author. A good example is 'The Cathedral and the Bazaar', by Eric Raymond (<http://www.tuxedo.org/~esr/>). This article is linked to from all over the Web. It encapsulates a key point of view about why open source software could succeed. The article has become a real book, which, while not a bestseller, is doing well.

But this is unusual. Authors who can pull readers in online are those that already have a reputation in the real world. Stephen King has done well out of publishing on the Web, but very few have the sort of enthusiastic following that King enjoys.

But the lure remains. An author gets between 10% and 15% from the sale of the books they write. At the same time, the author carries the risk of the unsold books, as the publisher holds a proportion of the royalties back to pay for books that are returned. If some come back from the bookshops, the author pays the cost of producing those books.

Digital distribution can sidestep this risk. Authors can sell their work online for two or three dollars and still be better off than they would be publishing in print. As long as the rights are cheap and no-one puts the book on a server, only a few copies will get passed around by email. The author is paid directly by the readers and there is no risk of returns eating into earnings.

It's at the readers' end that problems occur. It is impossible to read large chunks of text onscreen without getting eyestrain or a headache from sitting in front of a monitor for long periods of time. Printing the book out is one solution, but even though cheap laser printers are now quite fast, very few people want to print out the several hundred pages of a novel or a book on physics, for example. Ebooks do offer an alternative. Today, printing small amounts of text (30 or 40 pages) is quite viable. In this form it makes sense to revisit the old practice of serialising novels.

While music publishers squirm as 25% of their sales disappear onto the Internet, book publishers are losing no sales at all. Despite the price difference, book purchasers currently see little advantage in acquiring works from the Web.



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Regulating the Internet requires a lot more than good intentions.

The politics of control

Ashton Mills

Ashton Mills is editor of APC's Pocketbooks. He can be contacted at amills@acptech.net.

Like the antitrust suit against Microsoft, the regulation of the Internet was inevitable. Ever since its inception the Internet has represented a fantastic opportunity for global community, as well as a powerful threat to established social and economic conventions.

It's logical that the Web needs a set of laws to protect the interests of its citizens. However, the popularity of the Web has far outpaced the development of rules to regulate it. For some, this is exactly how they want the Web to be. For others, it represents a threat to power and control. The Web is pure information; instantly accessible. If information is power, it's not surprising that the Web has become a battleground for privacy, copyright and freedom of speech.

It's not just about protecting property or economic interests as exemplified by the crackdown on the Napsters and Gnutellas of the virtual world. It's also about mindshare and the ability to control what's coming (as Internet Explorer's integration demonstrates for Microsoft, and the very existence of services such as AOL and MSN shows). It's also about protecting the rights of users, and fully representing the liberties we take for granted in our virtual community.

Unfortunately, our current laws fit the Web about as well as an Armani suit fits your PC. And it's in this environment that governments, and sometimes corporations, are trying to enforce or create laws to protect their interests. The problem is that they're doing so in ignorance of the technology.

Examples are plentiful. While the Napster furore rightly pointed out that the software is being used to pirate music, it failed to grasp the fact that Napster is an example of the Internet at

its finest — an information community. With a better understanding of the Internet, the Recording Industry Association of America could have tapped into this community.

Australia's embarrassing attempt at Net censorship reeks of good intentions implemented with stunning ignorance. In the US, the jury is still out on DeCSS, the code that allows cracking of CSS encryption used on DVDs. In protest, it's possible to purchase T-shirts (online, of course) that list the entire source code to DeCSS — a cotton version of giving the finger.

Individuals, too, have to fight to protect their interests. There have been many instances of trademark violation just because a Web site happens to share a name with a product or company. The recent 'for Dummies' case involving Octapod, an Australian non-profit organisation for students and the unemployed, is a prime example of this. Almost always the name clash is a coincidence, and it's individuals who have to back down because they can't afford the legal fees.

But laws differ between countries, and you can pick up your information and locate it in a different jurisdiction without ever leaving your seat. This has been, and will remain, the best response wherever information is censored.

There's a lot of work to be done to regulate the Internet and protect and nurture the interests of all involved. In the meantime, bandaid fixes such as the DMCA and our own Net censorship laws are just making it harder for all of us to get along. The Internet is the fullest expression of the information age in which we live. But as long as the Web remains governed by laws that are not intelligently and specifically designed for it, there'll be trouble in paradise. ■

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There are few important matters to consider when choosing a motherboard.

Get onboard

Replacing your motherboard is about the most extensive system overhaul you can undertake, so choose your motherboard with future requirements in mind. There are a few important issues you should consider, and the most obvious ones relate to last month's Price Watch topic, CPUs (see APC July, page 60).

Intel's switch to building CPUs in both Socket and Slot-style designs that suit both 100 and 133MHz-based motherboards, makes choosing a CPU more complicated. To support your processor, your motherboard's frontside bus frequency needs to match the frequency your processor was designed to run on, and be capable of supporting the clock multipliers required to reach its ticketed speed. For instance, a motherboard that can support a 733MHz Pentium III will have a 133MHz FSB and be able to achieve a clock rate of 5.5x.

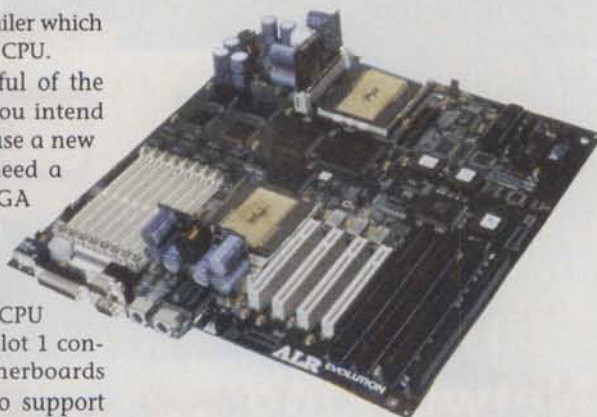
A motherboard's CPU support capabilities aren't always obvious on the packaging. However, all late-model Slot 1 motherboards that use Intel's BX chipset will support any Pentium II or III processor. This earns them a high score for upgradability. Some manufacturers use the chipset generation's letter designation when naming their motherboard models (eg. the Gigabyte GA686BX). Where a manufacturer uses Via Apollo or SiS chipsets, take a closer look at the documen-

tation or ask your computer retailer which of their boards will support your CPU.

You also need to be mindful of the architecture of the CPU that you intend to use. If you are planning to use a new Socket 370 processor, you'll need a motherboard with an FC-PGA (Flip Chip-Pin Grid Array) socket connector, otherwise you'll have to use an FC-PGA converter board to adapt the CPU interface so that it fits into a Slot 1 connector. There are fewer motherboards with Socket 370 connectors to support the new Coppermine and Celeron CPUs than there are with Slot 1 connectors. If this is what you need, look out for: the Asus CUV4X and the Gigabyte GA6VE7+.

Choosing a motherboard for an AMD CPU isn't as complicated as it is for an Intel. The Athlon is only suited to motherboards that use Via's KX133 chipset or AMD's 750 chipset. There are only a couple of manufacturers producing these motherboards. Your retailer will know what they are.

If you plan to use your system for gaming and you have a high-performance 3D video card, you'll want a board that supports 4x AGP. However, almost any board manufactured in the last six months will perform to the latest specifications. There are a couple of boards on the market with the advanced i820 chipset, which supports a new memory technology called RDRAM



(Rambus Dynamic Random Access Memory). They are expensive, and so is the RAM they require.

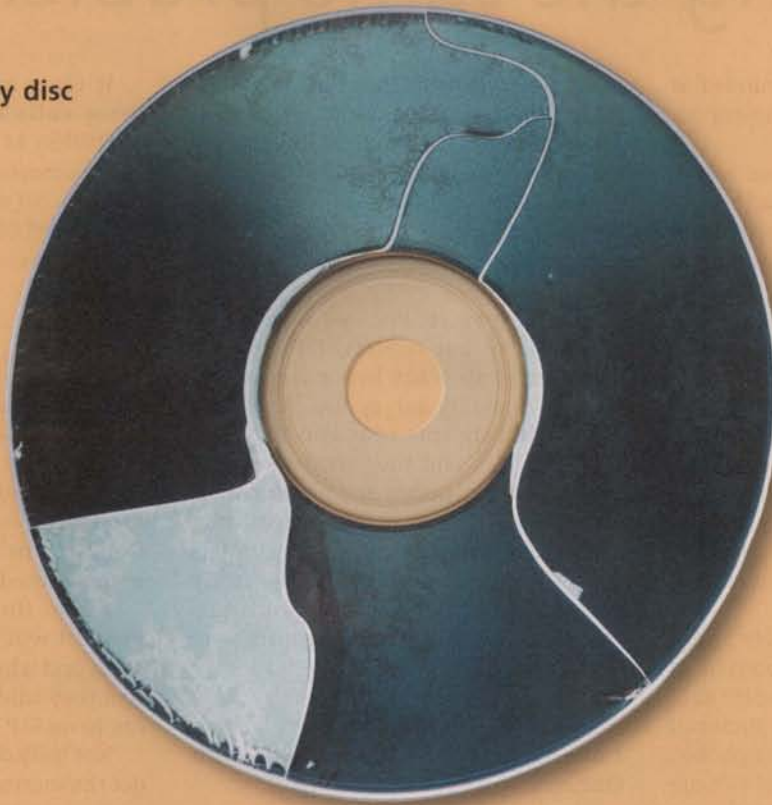
About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions.

Retailer	Contact	Model	Chipset	CPU interface	Price
TI Computers	http://www.ticomputers.com.au/ (02) 9437 5437	Gigabyte GA6BXC	Intel 440BX	Slot 1	\$178
		Gigabyte GA6BC7	Intel 440BX	PPGA370	\$198
		Abit BP6	Intel 440BX	Dual PPGA370	\$260
		Asustek K7V	Via Apollo KX133	Slot A	\$329
		Asustek K7MA	AMD-751	Slot A	\$329
		Asustek K7M	AMD-751	Slot A	\$305
EYO Technologies	http://www.eyo.com.au/ (02) 9822 2550	AOpen AX64Pro	Via Apollo Pro133A	Slot 1	\$225
		Asustek CUV4X-M	Via Apollo Pro133A	PPGA370	\$235
		Asustek K7V	Via Apollo KX133	Slot A	\$342
		EPoX EP-7KXA	Via Apollo KX133	Slot A	\$248
		Abit KA7-100	Via Apollo KX133	Slot A	\$393
			(features ATA100 IDE interface)		
Rite Price Computers	http://www.ompac.net.au/~rpc/ (03) 5672 4410	Gigabyte BX2000+	Intel 440BX	Slot 1	\$258
		Gigabyte GA-6VA7+	Via Apollo Pro133A	PPGA370	\$166
		Asustek P3V4x/533-U	Via Apollo Pro133A	Slot 1	\$225
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If you are having issues with your service provider, chances are you're not alone. **By Roulla Yiacoumi**

I'm having the same problem

Service & Reliability is astounded at the number of readers who experience the same problems.

Each month, we pore over your letters, but haven't had an adequate forum to publish your comments and complaints until now. Service & Reliability is expanding to two pages, and every month we will publish a selection of comments sent in response to the main letter published in the previous month's issue.

We'd like to hear about your experiences with retailers, Internet service providers, software and hardware companies or any other related issues. We also welcome your complimentary letters. Have you received particularly good service? Is there a business you would like to recommend to others?

To kick off, Service & Reliability brings you a selection of letters we received in response to a recent column about ISP eisa, which is currently experiencing financial difficulties (see 'Hanging on the telephone', APC April, page 62). It seems that ISPs are the cause of a lot of anger and frustration among readers.

APC reader Gerry Ward of Victoria wrote to Service & Reliability to complain about being charged for what he believed to be engaged calls to his ISP. His quarterly phone bill was regularly charged for between 400 and 600 local calls to his ISP. eisa's response was that it does "not generate the busy tone and is, therefore, not responsible for charges levied by the telephone carrier for engaged signals".

A month after his letter was published, Ward contacted Service & Reliability again with an update on his situation.

Dear APC
eisa has given me a new 'digital line' telephone number to dial in to.

Since using this line, my phone bills have decreased by about \$16 a month.

I have no idea when this line became available, but eisa never mentioned it in any correspondence.

eisa still maintains that Telstra should not charge for the failed

modem connections that they are registering and has asked me to seek agreement on this in writing from Telstra.

Telstra has said it will not give any such undertaking. Strange.

Gerry Ward
Carrum Downs, Vic

In the same column, we noted that, according to our readers, ISP One.Net had cleaned up its act. In our annual Service & Reliability survey two years ago, 75% of respondents who said they had tried One.Net said they went elsewhere because of poor access and performance. A year later, our survey showed there had been a sharp turnaround. Three quarters of One.Net respondents said they rarely or never encountered busy signals when trying to dial in. But some readers were not convinced.

Dear APC
I am on a \$19.95 a month plan with One.Net.

It takes me *at least* two and often three calls to successfully connect, regardless of the time of day or night. Furthermore, the One.Net server always cuts you off after four hours, regardless of the level of activity.

Peter Inglis
Internet

Dear APC

I have just read with interest your Service & Reliability column 'Hanging on the telephone' and I can only say that I was totally gobsmacked. My home ISP is One.Net, and I am constantly getting dropouts. Each time the response from One.Net has been that it is a problem with my modem.

I also find that for a one-month period I will be billed \$300-plus phone calls, and when I discussed this with Telstra they said that the majority of calls are to an ISP.

Not only do I get dropouts, but I also get the message 'User unable to connect



Illustration by Christopher Nielsen

to computer' after the username and password have been verified.

In your article you stated that "To One.Net's credit, it took notice of customer complaints and overhauled its network." Well, from my point of view this is rubbish. Each time I complain about the dropouts I get the same response: that it's obviously a problem with my modem. I was even told that it was a corrupt WINSOCK.DLL, and One.Net's technical support people suggested that I reinstall Windows 98.

The \$24.95 a month that I pay is increased significantly by the amount of extra phone calls that I make following dropouts, or failures to find host.

You might ask why I continue to stay with One.Net, and the simple reason is that for the time being they are the cheapest unlimited time ISP in Wollongong. As soon as ihug moves to Wollongong, I will be changing to ihug, because from all the reports I've received they have very few dropouts or busy signals.

Gary Wright
Internet

Another reader also extolled the virtues of a competitive ISP marketplace.

Dear APC

After being with Zip for nearly a year through the Wollongong POP, I had nothing but praise for them. I have since moved up to Sydney to run and develop Web sites, and during this time, Zip and Pacific Internet have amalgamated.

Not only has service to the dialups been less consistent, but the technical support is abysmal.

Because of this, I changed to Optus Internet's \$19.95 6am to 6pm plan with greater updates on the cache and no disconnections through the day.

The joys of a competitive ISP market!
Sol Combe
Internet

It seems dialling in to an ISP two or three times in order to gain a stable connection is not a problem limited to One.Net.

Dear APC

I'm currently having a big problem dialling in to my ISP, TPG Internet. It is taking me three dialup attempts to successfully gain an Internet connection that lasts for more than a few minutes.

I dial in, the Internet works for a few minutes then just 'hangs'. It doesn't disconnect, but all Web sites, email and so on are unusable. I manually disconnect,

dial in again and the same thing happens. On my third attempt I get a connection that is usable.

This happens every time, not just once in a while. I've never had this problem with other ISPs.

Daniel Cocks
Internet

We've also received a large number of complaints regarding free ISPs. After running a complaint letter about GlobalFreeway in Readers' Say (see APC June, page 51) GlobalFreeway, responses have been flooding in. We'll cover this issue in more detail in a future Service & Reliability column.

Dear APC

I have had problems with my ISP, a free provider called GlobalFreeway, and have sent numerous emails to the staff complaining about continuous dropouts.

GlobalFreeway's policy is no hidden costs, no Web site limits and no time constraints. On average, I am dropped off the system every 20 minutes. In terms of phone calls, it's costing me about \$18 a week! It would be cheaper for me to pay for access through a standard ISP. So far, the only response I have received from GlobalFreeway is 'Ring us on our 1900 number'. Sure — at \$2.50 a minute (more costs). Too bad if you haven't got access to 1900 numbers (which I don't). I know it's not just me, because my friends are having the same problem.

Kenneth Thwaites
Gippsland, Vic

Dear APC

GlobalFreeway's free Internet service is a joke. The ISP's modem is always engaged, support costs \$2.50 a minute, there is no resource on the Internet for looking up configuration settings to access the server, and you can no longer send emails unless you are logged into its server via modem. Worst of all, often when I connect I cannot browse the Internet. GlobalFreeway's DNS server seems to have a heart attack every other day, and even though you are connected to its server, you can't surf the Net.

Also, customers are limited to a one-and-a-half-hour connection (that is, if you can connect, and if it's one of the days their network is actually up). OzEmail may be expensive but at least it works.

Cameron Townshend
Internet

But not all GlobalFreeway customers were disenchanted with its performance.

Dear APC,

I have been using GlobalFreeway for the last six months and I love it. I fix computers for a living and when I sell a new computer system I install GlobalFreeway on it.

I have never had problems with GlobalFreeway and I recommend it for everybody to use.

Paul Galea
Internet

Dear APC,

I am no computer whiz, but I have had GlobalFreeway installed on my system for at least the last six months. It worked perfectly first time up and every time since. I have also installed it on a lot of friends' and relatives' systems as well, without a hitch. I have burnt multiple copies of my instal disc and given it to friends and customers and none of them have had any trouble either.

Steve Bennett
Internet

Another APC reader wasn't so sure about the reliability of OzEmail.

Dear APC

I've been an OzEmail customer in Sydney for about a year. In that time, I have experienced constant problems, including failed connection attempts, failed downloads and frequent disconnections.

To troubleshoot the problems, I have had Telstra trace the lines for faults, I've replaced my internal modem with a reputable external serial model, and I've tried many different configurations and initialisation strings as recommended by OzEmail tech support.

Nothing seemed to help, but after countless complaints to Telstra and OzEmail, the situation finally improved. Telstra discovered an earthed line and OzEmail upgraded its network to accommodate the volume. Makes you wonder who was at fault.

Gary Barlow
Internet

Share your experiences with other APC readers. Send your comments, good or bad, to ry@acptech.net or write to Service & Reliability, APC, PO Box 4088, Sydney NSW 1028. Letters may be edited for length or clarity. We regret that all letters cannot be answered personally.

Handheld PCs are gaining acceptance as mainstream corporate technologies. **By David Braue**

Business on the run

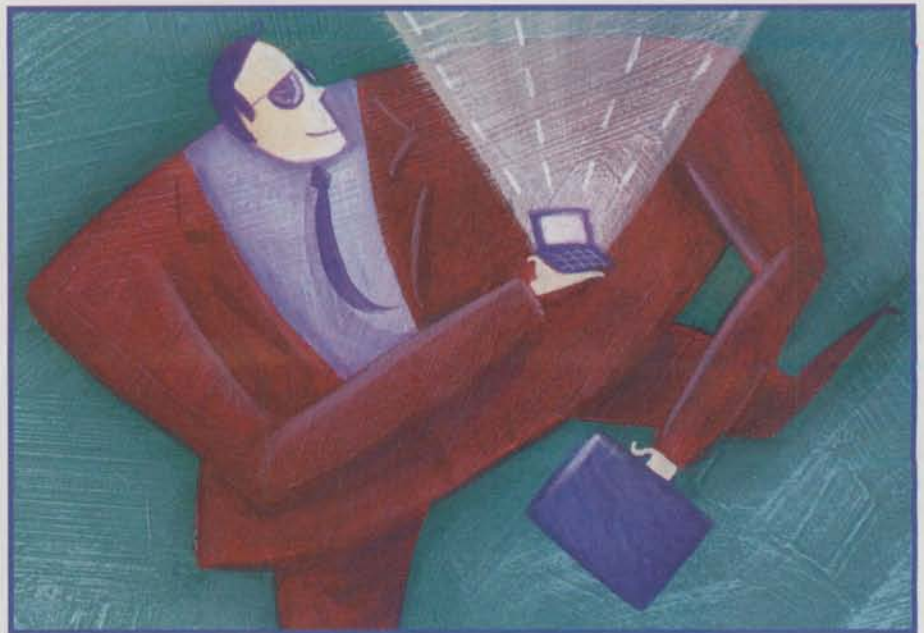
Surveys show that more than 70% of all handheld PCs are used in corporate environments. Late last year, analyst IDC projected that shipments of handhelds would grow from 5.4 million units in 1999 to 18.9 million units by 2003. Palm remains by far the largest single manufacturer with sales of more than 2 million per year, which is about 68% of the US market and 47% of the worldwide market last year.

Palm computers are so popular that they've become extremely difficult to find in the US, and sales of the Palm V and VII (a wireless model not yet available in Australia) have been hampered by a recent slowdown in component availability. Although this has shown signs of easing, corporate bulk purchasing might exacerbate the problem.

Palms have received a warm welcome at the Melbourne offices of law firm Freehill, Hollingdale & Page, where over 50 employees have made the Palm V an essential tool. It's used not only for maintaining scheduling and contact details, but more importantly, for remotely synchronising email to and from the firm's Lotus Notes system. Data is transferred between the Palm's infra-red port and that of new-model Nokia and Ericsson mobile phones, to link with Freedom Technologies' ASL-Connect Server (now called XTNDConnect). This acts as a conduit for email text between mobile devices and the Notes 4.6 system.

The relatively simple system has been a big hit, according to senior manager for information services Vic Wotherspoon. "Some people take a notebook computer with them just for email, but we thought there should be a more convenient substitute. Because we can now get email in real time, we are able to use Palms more. It's very convenient: at any point in time lawyers can find out what's in their calendar, even if secretaries are making entries in it when they're not in the office. I was in the US recently and synchronised my email while riding on a train."

Victorian roads authority, VicRoads, is exploring the use of Palm devices to assist its highly mobile maintenance crews. Palms are being trialled for recording information about road conditions and



necessary repairs or other work. To facilitate data transfer and keep the devices in sync with the rest of the organisation, VicRoads is using Tivoli's Device Manager for Palm Computing Platform to integrate them into its overall network and applications management framework.

Management software designed for handheld computers overcomes the problem of integrating standalone, individualised devices into network-focused computing environments. IT managers can control handheld software configurations as well as administer and back up user data — key factors if handheld PCs are to ever really fit into corporate environments.

Palm gets most of the attention, but it isn't the only player in the game. UK manufacturer Psion enjoys a small but loyal following for its handheld computers and Handspring is reinventing the original Palm. In May, Microsoft launched Pocket PC, its latest effort to dominate the handheld market, after two earlier versions of its Windows CE operating system failed to make an impact.

Paul Roworth, Microsoft Australia's product marketing manager for Windows, believes features such as XML (Extensible Markup Language) support, quasi-Windows compatibility and flexible wireless

expandability will finally make Pocket PC a corporate success. However, analysts say it could fail because Microsoft is still trying to cram too many Windows-style features into the product. They argue that Palm's success proves that customers value simple design and ease of use.

XML will be central to the future of handhelds for corporate use, since it enables information to be redesigned for handhelds without requiring separate handheld-optimised data sets.

Wireless support will also be crucial to fulfilling handhelds' potential for mobility. Although the wireless-enabled Palm VII has yet to ship outside the US, Palm Asia-Pacific director Craig Will said this will change by the end of the year. Initially this will be through a product that uses mobile phones for connectivity, and ultimately, with built-in connectivity that the Palm VII already offers in the US.

For now, the corporate world is still Palm's. "We're seeing exploding growth in corporate opportunities as people get used to taking data with them," Will said. "The fact that they're in your pocket and with you 16 hours a day is quite powerful."

David Braue can be contacted at david@braue.com.

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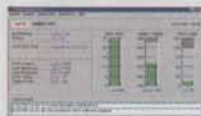
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Strange as fiction

If you think the funky technologies found in science fiction novels, movies and television are just fiction, think again. A new project could make them a reality.

With the exception of the space shuttle design, the space industry is in a rut. Rockets and satellites still look and function the way they always have. The space race took humans to the moon, and that was it. The only notable developments since then have been the occasional probes sent to other planets and beyond, the space shuttles, Hubble Space Telescope and the Mir space station. Most innovation has occurred in the secondary aspects of space exploration, such as heat resistant tiling, computing, miniaturisation, robotics and experiments on biology systems in zero-g. The ideas just don't seem to be coming thick and fast any more.

But what about all of the cool gadgets

mation on the Web site for consideration. For the first few days after the ITSF launch there was little on the site — a few ideas concerning the use of other planet's gravitational wells as interplanetary space craft slingshots (which NASA already use) and postings about books that people found relevant. Comments such as "2001 has some technologies which might apply" are not exactly helpful.

However, within weeks the site was brimming with ideas. Some of these are totally fantastical, others could be possible within a decade or so, and some could be developed now. One idea is hollowing out asteroids to build cities inside them, and introducing spin to create a gravitational force. Considering most asteroids are

thought to consist of solid stone or metal ore, this is possible, but not entirely feasible yet. Another suggestion is constructing space elevators, vast towers that reach from the planet surface to the high ionosphere to deliver payloads to spacecraft or stations, as in Arthur C Clarke's *2061: Odyssey Three* and Kim Stanley Robinson's *Red Mars*.

One of the best ideas so far on the site involves interstellar cyclers, which

are ships that constantly travel from one planet to another in a never-ending ring. This idea arose in response to the problem that a great deal of energy is used to slow spacecraft down when they approach a planet to land. This is immensely wasteful in a payload delivery scenario. These cycler ships would function as a delivery system between planets (ie. Earth and Mars). We would only need to send the payload up to dock with the cycler as it passes Earth on its way to Mars, and to unload in the proper orbital trajectory.

Not all the ideas are so grandiose. Some

Welcome to Cutting Edge

Each month, Cutting Edge will delve into fascinating breakthroughs and advances in the sci-tech field. Although many of these developments are speculative and may never see the light of day, some will eventually become part of our lives. If you have any ideas, comments or suggestions for this column, contact Darren Ellis at dellis@acptech.net.

deal with moulded furniture, cryo-sleep and the uses of anti-gravitational devices (in case they are ever developed).

Before you start scoffing and rolling your eyes, this is not the first time that fiction has helped advance science. There is an unconfirmed rumour that the curved windshield design from the *Thunderbirds* green International Rescue vehicle, Thunderbird 2, is the inspiration for future USAF aircraft design.

A few years ago US Marines started training on souped-up versions of *Doom*, and just months ago the US Navy started installing modified copies of Microsoft Flight Simulator in its Naval Reserve Officer training courses.

More recently the US Army, inspired by *The Matrix*'s famous 'bullet-time' effects and image manipulation as well as the simulation technology from *Star Trek: The Next Generation*, announced plans to create its own version a Matrix/Star Trek holodeck. Used for training, the army holodeck will be able to simulate anywhere, anytime in the world in real time 3D. It will be years before it provides any tactile feedback, but it should be visually stunning.

Certainly, the US military has the funding to make these things possible. "Not only will the [holodeck] happen, but it's really mandatory," said senior intelligence and technical advisor at the US Army's Land Information Warfare Activity, James Heath.

Darren Ellis can be contacted at dellis@acptech.net.



Brains and the gawd work on windshield designs.

and gizmos that 100 years of science fiction has given us? Surely inspiration can be found here? Under the auspices of the European Space Agency, Maison Ailleurs and the OURS Foundation have launched the Innovative Technologies from Science Fiction for Space Applications research project (or ITSF, see <http://itsf.spaceart.net/>). This project is designed to find descriptions and uses for technologies that could be developed from ideas in sci-fi novels.

And they need your help.

If you've read a book or magazine article or seen a movie that has interesting technology in it, you can enter this infor-

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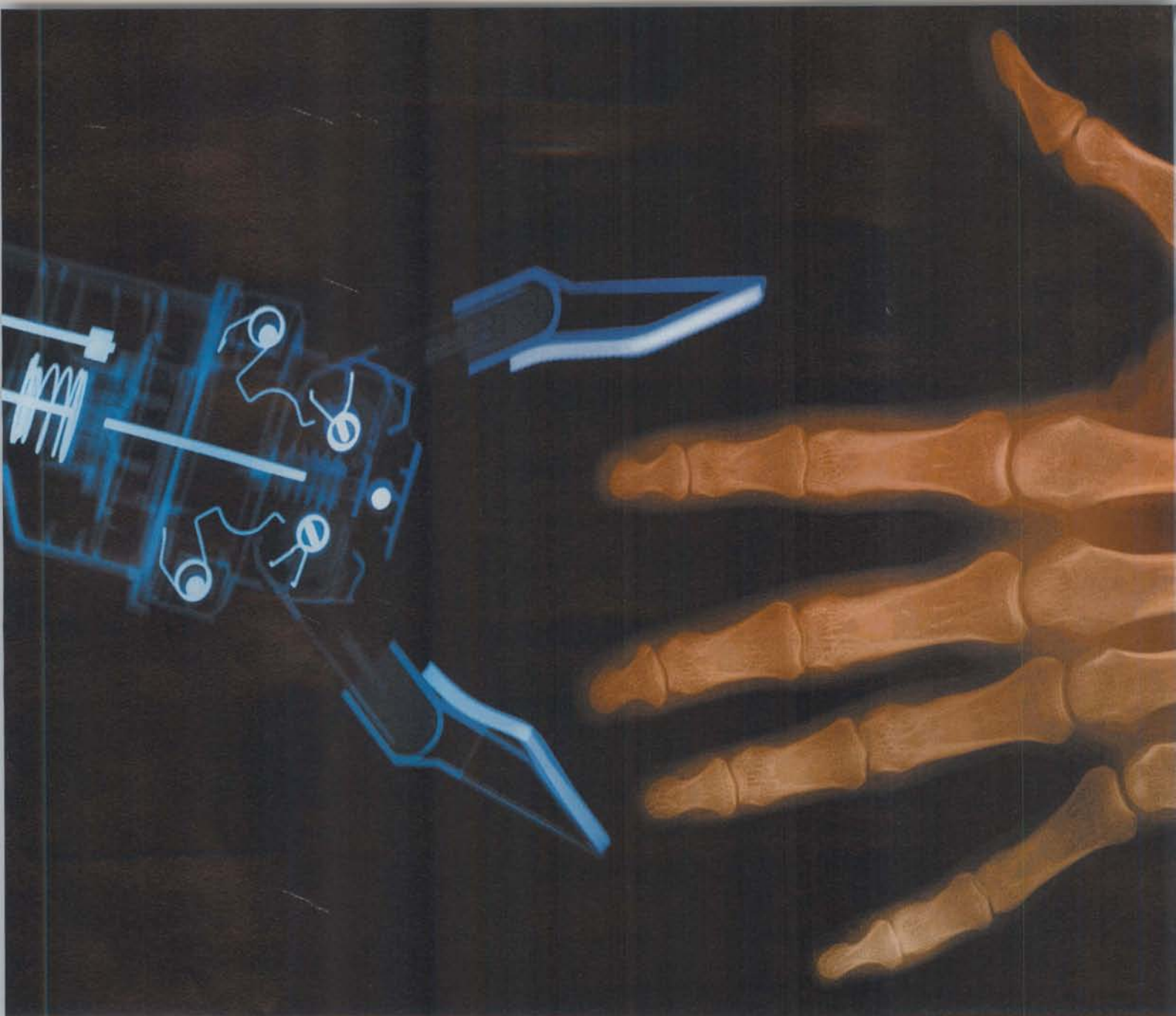
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It is easy to get caught up in the frenzy of new technologies, dot coms, e-commerce, antitrust lawsuits, mergers, content partnerships and IPOs. It's also easy to lose sight of the fact that Internet access is expensive, and many people can't afford it. It's said that mobile phones, datacasting and set-top boxes will bring the Internet to the masses, but even these are out of the range of many people. Is the ability to download pornography and pirate MP3s really that important? Why should we care if some people don't have access to the Internet?

In 1968, two researchers at the US Department of Defence's Advanced Projects Research Agency (ARPA) wrote an article called 'The Computer as a Communication Device', which was published in *Science and Technology* magazine. The article's authors, JCR Licklider and Robert Taylor, developed some of the concepts and technologies that led to the creation of

the ARPANet, a predecessor of the Internet. Taylor went on to found the computer science lab at Xerox's famed Palo Alto Research Centre. The article was one of the earliest works to discuss the social aspects of computer technology, and many of its predictions have turned out to be accurate, including the development of online communities and spam.

Towards the end of the article, Licklider and Taylor said "there will be plenty of opportunity for everyone (who can afford a console) to find his calling, for the whole world of information, with all its fields and disciplines, will be open to him — with programs ready to guide him or to help him explore. For the society, the impact will be good or bad, depending mainly on the question: Will 'to be on line' be a privilege or a right? If only a favoured segment of the population gets a chance to enjoy the advantage of 'intelligence amplification', the network may

exaggerate the discontinuity in the spectrum of intellectual opportunity."

Affordability would have been much more of an issue in 1968 than it is today. It was seven years before the invention of the personal computer, and at least a decade before PCs were capable of any of the communication functions Licklider and Taylor envisaged. However, the point still stands: if access to information via computer is a privilege, those who have access will have opportunities for self advancement that others won't.

How wide is the divide?

In the report *Use of the Internet by Householders* recently released by the Australian Bureau of Statistics (ABS), the dimensions of the divide could not be clearer. The report found that 73% of Australian adults with incomes of over \$80,000 used the Internet in 1999, compared to only 34% of Aus-



The Digital Divide

Those who spend much of their lives online can forget that almost half the people in Australia have never used the Internet, and many never will. The Internet is far from essential now, but eventually it will be difficult to participate fully in society without being online. How soon will this digital divide become a serious social problem and what can be done about it?

Josh Mehlman examines the scope of the problem.

Australians with incomes of less than \$40,000. Similarly, 52% of households with incomes over \$100,000 had Internet connections, compared to 31% of households that earned between \$50,000 and \$75,000. Only 6% of households with an income of less than \$25,000 had Internet access. Among employed adults, 54% used the Internet, but only 19% of unemployed adults did.

Not surprisingly, Internet use was found to be much more common among white-collar workers than their blue-collar counterparts; white-collar workers were much more likely to have Internet access at work, as well as more opportunity to use it. Education level was also a major factor in Internet use; 80% of university graduates used the Internet, compared to only 28% of high school graduates.

When you compare the 1999 and 1998 figures, there is strong evidence to suggest that the gap is widening. For households

with incomes under \$25,000, Internet use grew from 5% in 1998 to 6% in 1999. Internet use in households with incomes between \$25,000 and \$50,000 grew from 12% in 1998 to 17% in 1999. Growth was strongest in households earning between \$50,000 and \$75,000, where Internet use grew from 21% in 1998 to 31% in 1999. This suggests that Internet use is becoming a mass-market product and is much more frequently used by people on above-average incomes. Those on lower incomes are being left behind.

Statistics from other countries reinforce these trends. Each year for the last three years, the US Department of Commerce has published a report on the digital economy. The latest report, *Digital Economy 2000*, notes that the growth of Internet use "has been most rapid among those households with higher incomes, more education, computers at work, white or Asian backgrounds, and headed by persons aged

35 to 50". It raises serious concerns about other groups — those on lower incomes, with less education, in blue-collar jobs, from non-white or non-Asian backgrounds, or over 50 — who are "falling through the Net".

It's not just income

The inability of rural Australians to access telecommunications services in general has been dealt with at length by APC and the mainstream media. Rural telecommunications access has received a reasonable amount of government attention, although a great deal of evidence, including feedback from APC readers, suggests that despite government promises, there is still a large gap in services between city and rural areas.

Many rural Australians do not have access to the kind of services that Australians living in cities take for granted,

such as local call Internet access or data speeds greater than 9,600bps. Not surprisingly, the ABS found that the rate of Internet use in metropolitan areas was much higher than in other areas: 45% of city dwellers accessed the Internet in 1999, compared to 33% of those living in other areas. Rates of computer ownership in country and city households were not very different, but 26% of city households had Internet access compared to only 15% of households outside cities.

A technology underclass

The disparities between the 'haves' and the 'have-nots' start as early as primary school, according to Ed Smith, general manager of Virtual Communities, a company which offers finance plans on computer hardware and Internet access to low-income families. "Kids who have computers at home hand in their schoolwork typeset and spellchecked. They may have researched it on the Net. It quickly becomes

incomes were less likely to have computers at home, and their schools were less likely to have adequate computing resources.

The study found that boys' and girls' basic skills were comparable, but that girls lagged behind boys in learning advanced skills. Since most advanced skills are learned outside school, "where girls do not learn advanced computer skills at home, they tend not to use them at all." The study also found that girls were less likely than boys to have their own computer at home, and were less likely to use computers for games and communications. A study released in May by the Pew Internet & American Life Project found that women's use of computers for communications is currently undergoing a boom, so perhaps this disparity will even out over time.

Job hunting

Once out of school, those who lack computer skills find themselves at a great disadvantage when seeking employment. Employers are starting to assume their new employees will be computer literate, according to Smith. "If you start a new job now and you can't use word processing or the Internet, who's going to train you? Someone else will get the job. Even though you've used a computer a couple of times at school, it wasn't part of how you grew up."

The demand for computer skills can only increase, and those who lack skills will become increasingly unemployable, according to Don Tapscott, author of the book *Growing Up Digital: The Rise of the Net Generation*. He believes that for those without computer skills, employment prospects, potential income levels, prospects for a stable family and even the potential for a fulfilling life are all reduced. "We have seen what happens to people who become more and more discouraged and get caught in a downward spiral. Only this time their sense of helplessness and desperation would be even more severe."

Even if skills are not the issue, the Internet can make the difference between getting the job and not getting it. Some jobs advertised online are not advertised elsewhere, and candidates with Internet access can often find better advice and more information about their prospective employer in preparation for an interview than their offline competitors. "The addition of the Web unbalances the situation in favour of those with access, leaving those without struggling to keep pace," said Alan Lawson, a research analyst with UK-based research firm the Butler Group.



Only 6% of Australians aged 65 and over used the Internet last year. The likelihood of Net use declined with age.

Despite the popularity of whimsical images depicting grandma and grandpa getting on the Net, the ABS found that the largest group of Internet users were aged 18 to 24, and that the likelihood of Internet use declined with age. Only 6% of Australians aged 65 and over used the Internet in 1999.

The Human Rights and Equal Opportunity Commission's (HREOC) recently released report *Accessibility of Electronic Commerce and New Services and Information Technologies for Older Australians and People with a Disability* found that moving services online was a mixed blessing for the elderly and those with disabilities. The report found that "the self-service model cannot be expected to suit all users, and may present serious access barriers to some people with disabilities, but for other people availability of this model represents independence and equality."

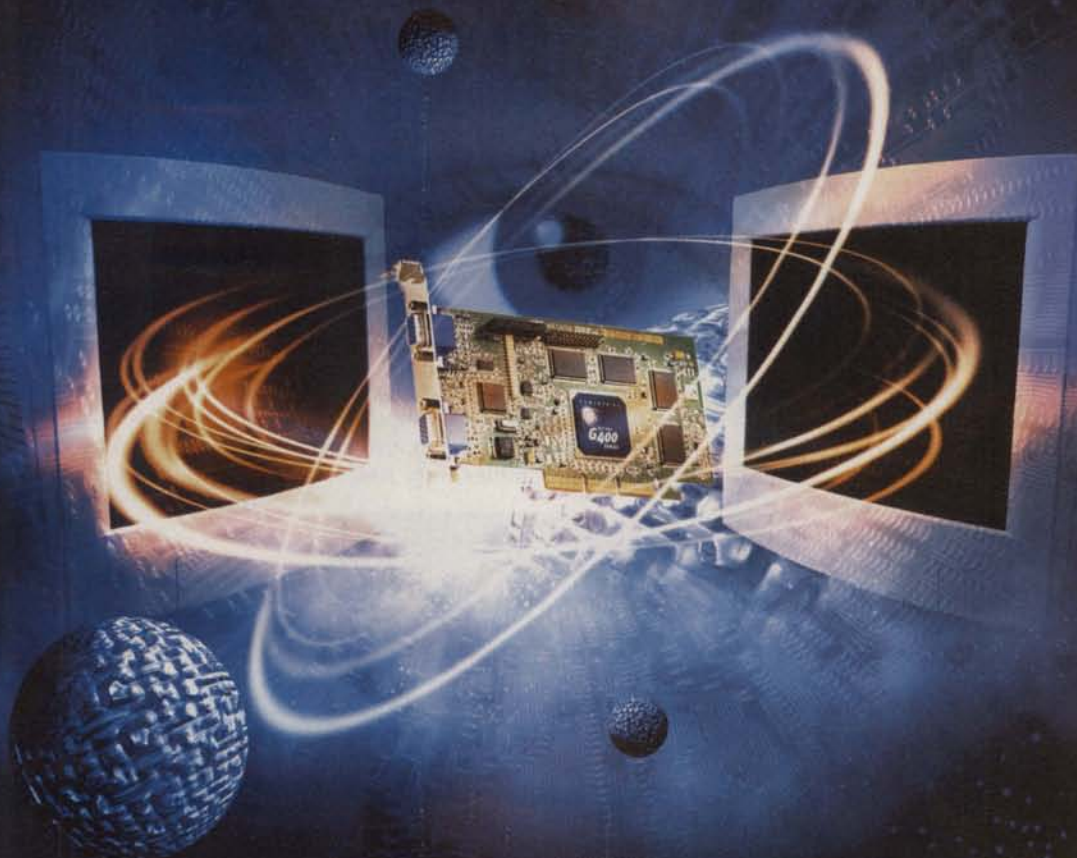
The gap between men and women on the Web is narrowing, but it's still there. The ABS found that 45% of Australian adult men accessed the Internet in 1999 compared to 37% of women. There are no comparable Australian statistics available, but studies in the US have also found divides along racial lines. Studies by Vanderbilt University and the Pew Internet & American Life Project found that white Americans were more likely than black Americans to own a computer, and that white Americans were more likely to be regular Internet users than either black or Hispanic Americans.

apparent which kids will go on to university and which won't. Kids are getting disenfranchised and starting to feel hopeless at a very young age."

A 1998 study by the ABS, entitled *Real Time: Computers, Change and Schooling*, found that the majority of school students who had advanced computing skills learned these skills at home. However, the study also found that in schools with favourable student-computer ratios (few students per computer), students were more confident about their own basic and advanced skills, and more likely to enjoy and spend more time using computers at school. The schools that had the best student-computer ratios, the study found, were private schools and those in high-income and urban areas.

Indigenous students and students from small schools in rural areas were found to have the lowest level of basic computing skills, such as moving files and opening, saving and printing documents. Students in small schools, and schools in rural, isolated and low-income areas had the lowest level of advanced computing skills, such as creating a Web page, searching the Web and programming.

The study found a strong correlation between the level of computing skills and the average income of households in the school area. A higher proportion of students at schools in high-income areas had computing skills than students at schools in low-income areas. The difference was most marked in the case of advanced skills. Students whose families had low



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As Internet use pervades more of everyday life, lack of Internet access becomes more of a disadvantage. "Soon the Internet will be the conduit for effective participation in almost all elements of life, ranging from education through to health care," Tapscott said. "This is the most profoundly consequential access issue to ever arise with respect to technology. It is far more consequential than universal access to television or the telephone."

Many analysts believe the digital divide is a symptom of wider social inequalities, rather than a problem in itself. "People who are socially marginal, and others such as Australian Aborigines, people who are homeless, people living in caravan parks — these people have no access whatsoever," said Alec Pemberton, senior lecturer in sociology and social policy at the University of Sydney. He believes patterns of technology usage are a reflection of the "systematic bases of social inequality of material and cultural resources."

What can be done?

In *Growing Up Digital*, Tapscott says there are two opposing and irreconcilable views on how to solve the digital divide. In one corner are the statisticians, who argue that the Net is an essential service and a key part of the economic infrastructure, and should therefore be planned, controlled or even owned by the government. In the other corner are the market determinists, who believe that market forces will drive the price of access down to the point where everyone can afford it. They believe government planning can only interfere with the operation of the free market, and that "efforts to achieve universal access are basically silly or even dangerous." Not surprisingly, this view has the greatest support in North America, particularly the US.

Market determinists often use the example of television to support their case. TV can be found in 99% of US households. This represents a level of penetration greater than that of the telephone, which is found in 93% of US homes (despite the US government's policy of universal phone access, in place since 1934). Clearly a universal access policy does not guarantee the highest levels of use. Even though there aren't any US-based TV manufacturers, TV has made it into more homes than telephones, they argue.

Tapscott sees problems with both approaches. Government regulation and planning often involve choosing one technology over another, but digital media are growing in chaotic and unpredictable ways, defying regulation. Private sector

investment and an open, competitive market are the best way to ensure the progress of technology, which will lower prices. But lower prices are not a solution in themselves, argues Tapscott, because the Internet is already skewed towards users who are literate and motivated to actively participate. Those who are disadvantaged in income, education and personal empowerment will be the least able and motivated to embrace the opportunities of the Net.



The solution lies somewhere in between the two approaches, says Tapscott. "We need private sector innovation and competition to make the best products available in the shortest time period, but we also need deft and well-targeted public sector efforts to make sure that disadvantaged groups in society are not left behind." He lists four key areas that, together, he believes will go a long way to solving the problems.

1. Governments need to reinvent the education system and enact programs that encourage universal Internet access. "Government programs that encourage greater effective access to the Internet are essential. In particular, kids have to be able to integrate the Web into their day-to-day, hour-by-hour learning," he said. Governments also need to ensure high levels of competition and should themselves be model users of digital media.
2. Volunteer programs such as Alliance for Youth and 2B1 (both US programs) are needed to give those who have technical knowledge the opportunity to share their knowledge.
3. Businesses need to develop a greater sense of social responsibility. Examples include offering free or subsidised PCs to

their employees and their families, giving IT professionals the time to pass on their expertise to others, and investing time and resources into the community. These steps do not have to be entirely altruistic, according to Tapscott, because they are investments in the human capital of employees, and help to teach the skills that will be required by the new economy workforce.

4. Communities need to build their own computing centres, networks and non-profit ISPs.

What's being done?

Governments around the world vary in their level of awareness of, and approach to, the digital divide. The extent to which these governments put their money where their mouth is also varies. The US, UK and EC governments have all put in place programs to deal with the problems of Internet access.

US

The US government has paid a great deal of attention to the digital divide. President Clinton mentioned it in his most recent State of the Union Address, and reports from the Department of Commerce and National Telecommunications and Information Administration highlight the issues. There is even a Web site (<http://www.digitaldivide.gov/>) that focuses on government, industry and community efforts to bridge the divide.

In February, Clinton pledged \$US50 million towards the ClickStart program, which allows low-income families to purchase computers and Internet access at low cost, (reportedly between \$US5 and \$US10 a week). He also pledged up to \$US2 billion in tax incentives over 10 years to encourage companies to donate computers and training to community technology centres.

In April, Clinton made a series of speeches aimed at increasing awareness of the digital divide. He pledged \$US150 million towards training teachers to use technology and \$US100 million towards building community technology centres. He called on the technology industry to provide funding and resources. A group of companies including Gateway and Novell pledged \$US100 million towards providing schools with computers, Internet access and training for teachers. Clinton's advocacy of digital divide programs is not without its critics. This is mostly because the statistics the US government's schemes are based on are over two years old.



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Free Website



The government has shown little concern about the digital divide, but it takes credit for Australia's increasingly important position in the global information economy.

UK

At a knowledge economy conference in March, British Prime Minister Tony Blair pledged to get everyone in the UK online within five years. "The knowledge economy must be an economy for the many and not the few. Universal Internet access has to be available to all," he said.

His government has made a series of commitments, including a £1 billion program to connect every school and library in the UK to the Internet by 2002, a £252 million program to establish 1,000 IT learning centres, and a scheme to make 100,000 refurbished computers available to low-income families. The government also pledged £25 million to provide computer training courses for up to 50,000 unemployed people. Theoretically, the UK government should also follow the initiatives put in place by the EC.

EC

In December last year, European Commission President Prodi announced the eEurope initiative, which aims to bring the benefits of the information society to all Europeans. eEurope has three key objectives:

1. to bring every citizen, home and school, every business and administration, online and into the digital age;
2. to create a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas;
3. to ensure that the whole process is socially inclusive, builds consumer trust and strengthens social cohesion.

The initiative identifies 10 priority targets: Internet access in schools; cheaper Internet access; accelerating the implementation of ecommerce; high-speed Internet access for researchers and students; smart-

cards for increased security; availability of risk capital for high-tech businesses; full participation for the disabled; maximising the use of technology in health care and public transport; and ensuring government services and information are available online. This is certainly the broadest-ranging program undertaken by any government to date, but it's still short on details of practical implementation, funding and a time frame.

Australia

In Australia, there is an awareness of the digital divide at a bureaucratic level if not a ministerial one. Reports by the ABS and the HREOC have tackled the issue. However, the Howard Government has so far shown little concern about the digital divide, and is instead taking credit for Australia's increasingly important position in the global information economy.

IT minister Richard Alston was not available to discuss the government's attitude to the digital divide with APC, but a spokesperson from his office listed several indirect ways the government was addressing the issue. The spokesperson was unaware of the existence any of the overseas government initiatives listed above, but said the government was more interested in addressing the issue at a grassroots, community level, rather than having a one-size-fits-all program with a catchy title.

"This reflects directly on a lack of leadership and understanding on the part of the Federal Government," IT shadow minister Kate Lundy said. Lundy accused the government of using universal Internet access as a political Trojan horse to push other less politically palatable objectives such as the sale of the remainder of Telstra.

The government has put in place several programs designed to improve Australians' access to telecommunications. The most notable of these is the Networking the Nation initiative, through which the government releases funds for telecommunications projects in regional and rural Australia.

Recently, the government allocated \$20 million to a company called Farmwide, which aims to provide local call Internet access to users who have to call long distance to access the Net. Another recently announced project under Networking the Nation will create community technology centres in 55 small towns in NSW. The government has pledged \$8.25 million towards this project. Since the start of the Networking the Nation initiative, over 400 projects worth \$197 million have been funded by the government.

There is political mileage to be gained from spending money to increase services to rural Australia. The government is surely mindful of the rural backlash that caused the Kennett government's surprising loss in last year's Victorian election, and rural voters are seen as the key to the next federal election. There is much less obvious political advantage for the Howard Government in addressing the issue of connectivity for lower-income families, and therefore it is much less willing to spend money in this area.

"At the end of the day, taking off wholesale sales tax and making access cheaper through competition are what's going to make the Internet more attractive and more affordable for low-income families," Alston's spokesperson said. However, while the removal of wholesale sales tax might reduce the cost of hardware, the accompanying addition of GST will drive up the price of Internet access.

The government is spending money on developing IT skills in the Australian workforce. It has pledged \$5 million towards the establishment of an IT skills institute, which will work with current industry and education bodies to ensure IT training is up to date. "By developing a vibrant IT industry, we're giving people opportunities to have jobs and an incentive to develop their skills," Alston's spokesperson said.

Working within the current industry structure, the government does little to make IT training more accessible to people or small businesses who feel that they need more IT skills, but can't afford it. At the state level, the NSW government, in conjunction with Oracle, has started a pro-

gram called RestartIT, which gives IT skills training to the long-term unemployed.

A national school connectivity program such as the one announced by UK Prime Minister Tony Blair would not be possible in Australia. Because of the way Australia's education system is funded, each state is responsible for providing computers, Internet access and technology training for teachers in its schools. State governments are spending money to put computers in schools, but how far that money will go is a serious question.

Victorian education minister Mary Delahunty pledged an additional \$15 million for IT in schools in the 2000/2001 budget, including \$7 million for the purchase of new PCs. If distributed evenly, this new PC funding would give \$4,200 to each of Victoria's 1,650 public schools, or perhaps three inexpensive computers (at retail prices) for each school.

Similarly, Queensland education minister Dean Wells promised \$10 million towards IT training courses for teachers, promising that all Queensland teachers would be trained to a minimum level of computer literacy. Divided evenly, this would provide \$300 for each of Queensland's 33,500 public school teachers, which might buy a day of basic computer training.

The ALP has not yet released a policy regarding the digital divide, but Lundy said there was broad support within the ALP caucus for a policy to address the issues of Internet access. "People who are weekly recipients of government services would be a genuinely meaningful target group," she said. "What better way to contribute proactively to upskilling people than by building confidence and raising awareness with regard to the Internet? Actively putting computers in people's homes where there is a reason for them to use the medium for a practical purpose in their lives. There's a clear need for governments to work at the problem from the bottom up."

One such 'bottom up' approach is Virtual Communities, which sells low-cost computers and Internet access through pay-by-the-week finance plans for as little as \$9.95 a week over three-and-a-half years. Virtual Communities was started by the ACTU and three superannuation funds, and was initially available to members of those organisations, although it had some trouble fulfilling orders in the early stages of operation. The scheme was later expanded to include members of the Catholic Church, and recently became available to the community at large.

"If you're Australian, you've grown up to believe your birthright is equal access to

Don't bank on it

At first glance, banks moving their services online appears to benefit both customers and banks. "By moving their operations online, banks can carry out transactions at around 10% of the cost. They can pass these savings on to customers in the form of very attractive interest rates," said the Butler Group's Lawson. For example, ING Direct offers interest rates significantly higher than its branch-based competitors. ING also allows transactions to be made over the phone, which means almost anyone can access these services.

However, in the UK, an online bank called Egg (<http://www.egg.co.uk/>) only allows Internet transactions. "Allowing for the fact that a minority of any bank's customers will be responsible for the majority of its wealth, it starts to make economic sense to the bank to offer a service directed at that minority, and the Internet is an ideal channel for such a service," Lawson said. These customers

also have more money to spend on additional services such as insurance and investment, something many local online banking services also promote.

Not only are the information-poor denied access to higher interest rates, but access to banking will become more difficult, as online banking is more profitable than branch-based banking. Branches that have low levels of activity are the least profitable, and are likely to be the first to close. Unfortunately, these are the branches that are in areas with the lowest rate of Internet adoption: low-income and rural areas. "People who are denied Web-banking facilities must continue to deal with branches, which may be under threat of closure. This leaves us with the possibility that the people who need the local bank the most, such as the elderly or those on limited incomes, will find that resource withdrawn," said Lawson.

things like education and health care. Organisations like the union movement and the Catholic Church believe that the real issue is equality of access to information," Smith said.

While most people would think of 'community' computing resources as referring to geographical communities, Virtual Communities targets communities based around common interests, and gives them an online place to communicate and share ideas, as well as making the technology to connect to these online communities more affordable. "The things that get us to congregate offline also work online. Congregating physically isn't obsolete, but online congregating augments it," Smith said.

Symptom or cause?

Analysts agree that the digital divide is a symptom of deeper divides within society, but don't agree on whether or not it should be treated as a separate issue. Alan Lawson is critical of the UK government's program to make low-cost PCs available to low-income families, because it overlooks the ongoing costs of using the Internet and the resulting increase in phone bills. "The point remains that the government failed to recognise that some elements of society simply lack the financial resources to make full use of the Web.

The digital divide is not a problem about technology, it is a problem about the economy," he said. He feels that governments would be better off treating the fundamental causes of the problem. "Governments which address their national economic issues will, by extension, be addressing the problems that actually create divisions in society, including the digital divide."

Tapscott agrees that addressing the bigger issues is important, but thinks that society can't wait. A combination of government initiatives and market forces will make the Internet accessible to everyone eventually, but in the meantime an entire generation of have-not children will grow up without technology as part of their everyday lives. When they are adults, they will be forced to adapt to technology.

"No country that wants to effectively participate in the global digital economy can afford to wait for these problems to be solved. If kids in lower-income neighbourhoods don't become digitally proficient and tap into the energies of the Web, they are effectively doomed to an impoverished life. The upshot is that we can't say the digital divide is a symptom of greater issues. That will just cause delays we cannot afford," he said. "Moreover, providing universal access to the Web is a large part of the solution to these problems." ■

ISP Service & Reliability Survey 2000

Yes, it's that time of year again. Here's your chance to tell us everything about your ISP and online experiences. Complete this survey and return it to us by Friday August 18, 2000, to be in the running to win a bunch of fantastic prizes!

ISP

1. What is the name of your current ISP?

2. How long have you been using this ISP?

- 1 ☐ Less than six months
- 2 ☐ Six months to a year
- 3 ☐ One to two years
- 4 ☐ More than two years

3. How did you hear about this ISP?

- 1 ☐ Someone told me about it
 - 2 ☐ I saw an advertisement
 - 3 ☐ I searched online
 - 4 ☐ I read a review
 - 5 ☐ I received a sign-up CD
 - 6 ☐ Other, please state:
-

4. Why did you choose this ISP? (You can tick more than one box.)

- 1 ☐ Price
 - 2 ☐ It was recommended to me
 - 3 ☐ It was a local ISP
 - 4 ☐ I could pay by a method other than credit card
 - 5 ☐ It offered free Web space for my site
 - 6 ☐ It offered a number of hours of free access
 - 7 ☐ It received a good review in a magazine
 - 8 ☐ Connection speed
 - 9 ☐ Customer support
 - 10 ☐ Other, please state:
-

5. What is your current pricing plan?

- 1 ☐ Hourly charge
 - 2 ☐ Monthly charge that includes a certain number of hours or download limit
 - 3 ☐ Monthly charge with unlimited use
 - 4 ☐ Annual account
 - 5 ☐ Prepaid block of time
 - 6 ☐ It is a free ISP (go to Q7)
 - 7 ☐ I have a complimentary account (go to Q7)
 - 8 ☐ Other, please state:
-

6. How would you rate your current ISP for value for money?

- 1 ☐ Very poor
- 2 ☐ Substandard
- 3 ☐ Average
- 4 ☐ Very good
- 5 ☐ Excellent

7. How would you rate your current ISP's performance?

- 1 ☐ Very poor
- 2 ☐ Substandard
- 3 ☐ Average
- 4 ☐ Very good
- 5 ☐ Excellent

CONNECTION

8. Describe your connection method

- 1 ☐ Modem
 - 2 ☐ ISDN
 - 3 ☐ Cable
 - 4 ☐ Satellite + modem
 - 5 ☐ DSL
 - 6 ☐ Other, please state:
-

9. What is your connection speed?

- 1 ☐ 14.4Kbps
 - 2 ☐ 28.8Kbps
 - 3 ☐ 33.6Kbps
 - 4 ☐ 56K
 - 5 ☐ Greater than 56K
 - 6 ☐ Other, please state:
-

10. How often do you receive a busy signal when you dial in to your ISP?

- 1 ☐ I usually dial several times before I can get a connection
 - 2 ☐ I sometimes get busy signals, but I don't have to wait very long to get through
 - 3 ☐ Busy signals are rare — I usually get through on the first or second try
 - 4 ☐ I've never had a busy signal with this ISP
 - 5 ☐ I have a permanent connection (go to Q12)
-

11. Once you have successfully connected to your ISP, how often does your connection drop out?

- 1 ☐ Almost always
- 2 ☐ Regularly
- 3 ☐ Sometimes
- 4 ☐ Rarely
- 5 ☐ Never

12. On average, how often do you access the Internet?

- 1 ☐ A few times a day
- 2 ☐ Once a day
- 3 ☐ Once every few days
- 4 ☐ Once a week

5 ☐ Once or twice a month

6 ☐ Other, please state:

13. On average, how long do you spend online each time you access the Internet?

- 1 ☐ Less than 15 minutes
 - 2 ☐ About half an hour
 - 3 ☐ An hour
 - 4 ☐ More than an hour
 - 5 ☐ More than two hours
 - 6 ☐ Other, please state
-

CUSTOMER SUPPORT

14. Have you ever contacted your current ISP's customer/technical support?

- 1 ☐ Yes
- 2 ☐ No (go to Q21)

15. In the most recent instance, by which means did you contact your ISP?

- 1 ☐ Phone
- 2 ☐ Email (go to Q17)
- 3 ☐ Fax (go to Q17)
- 4 ☐ Letter (go to Q17)
- 5 ☐ Instant message (go to Q17)
- 6 ☐ Other, please state:

(go to Q17)

16. How long did you spend on hold?

- 1 ☐ Less than a minute
- 2 ☐ Less than five minutes
- 3 ☐ Less than 10 minutes
- 4 ☐ Less than 15 minutes
- 5 ☐ More than 15 minutes

17. Why did you contact support?

- 1 ☐ To inquire about different pricing plans
 - 2 ☐ To help me set up my account
 - 3 ☐ Could not access my email
 - 4 ☐ Billing problems
 - 5 ☐ Technical difficulties (including browser configuration)
 - 6 ☐ To cancel my account
 - 7 ☐ Other, please state:
-

18. How would you rate your ISP's customer service?

- 1 ☐ Very poor
- 2 ☐ Substandard
- 3 ☐ Average
- 4 ☐ Very good
- 5 ☐ Excellent



19. How long did it take for the query to be resolved?

- 1 ☐ Straight away
 2 ☐ Less than five minutes
 3 ☐ Less than 15 minutes
 4 ☐ Less than an hour
 5 ☐ Within the same day
 6 ☐ More than a day

20. Do you think this was a reasonable time in which to solve the problem?

- 1 ☐ Yes
 2 ☐ No

21. Have you ever paid your ISP extra for technical support (this includes dialling a 1900 number)?

- 1 ☐ Yes
 2 ☐ No (go to Q23)

22. Do you feel the technical support was worth the money paid?

- 1 ☐ Yes
 2 ☐ No
 3 ☐ Not sure

CHANGES

23. Have you ever used another ISP?

- 1 ☐ Yes
 2 ☐ No (go to Q28)

24. Including your current provider, how many ISPs have you used?

25. In order, name the ISPs you have previously used. List the most recent first:

1 _____

2 _____

3 _____

4 _____

26. Why did you leave your last ISP?

- 1 ☐ Too expensive
 2 ☐ Poor connections
 3 ☐ Too many busy signals in peak time
 4 ☐ Poor customer service
 5 ☐ Incorrect billing
 6 ☐ The ISP went out of business
 7 ☐ The promotional offer ended
 8 ☐ I left the place where I had the account
 9 ☐ I moved from the area
 10 ☐ Other, please state: _____

27. Do you have any comments about any of the other ISPs you have used?

WIN!

28. To be in the running for our prizes, simply tell us in 100 words or less what you think of your current ISP. If you need more room, please attach an extra sheet.

Entry details

To complete this survey and be in the running for the prize draw, fill in the following details and tell us in 100 words or less what you think of your current ISP.

Name _____ Address _____
 Email _____ Suburb _____
 Daytime phone number _____ State _____ Postcode _____

One entry per household only. Multiple entries will be disqualified. The survey may only be completed by Australian residents. Question 28 must be answered to enter. Entries close midnight Friday August 18, 2000. Winners' names will be published in the November 2000 issue of *Australian Personal Computer*. APC judges will select the best response as the winner of one of three Epson colour inkjet printers. The prizes are at the discretion of the supplying vendors and may be altered depending on availability. All surveys, including your comments, become the property of APC and are for APC's exclusive use. Names are not sold or given to other parties. APC may publish any of the respondents' comments in the reporting of the results.

Winners' names and survey results will be published in APC's November 2000 issue. Good luck!

The winning entry will receive:

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2nd prize

EPSON STYLUS COLOR 860
 A4 inkjet valued at \$560

3rd prize

EPSON STYLUS COLOR 760
 A4 inkjet valued at \$460

Enter for a chance to win one of three professional quality Epson Stylus colour inkjet printers for fast black-and-white printing, and superb colour. All three feature Epson's Variable-Sized Droplet Technology and Picture Perfect Imaging System for the clearest, highest quality colour photo prints. They print paper up to A4 size, have a resolution of up to 1,440 by 720dpi, and can connect through parallel and USB ports.

EPSON

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- Mail APC S&R Survey 2000
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Sydney NSW 1028
- Online <http://apcmag.com/service/> and follow the link
- Fax (02) 9267 4909



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PROBLEM 2: Minimising the size of electronic components escalates their cost dramatically.

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*"It is indeed a
cheap computer."*



PCs on

If you want to own your own system sooner rather than later, a budget machine could be the answer. APC hunted around for the cheapest PCs and came up with these bargains — from a low \$1,299 to just under \$2,000. **By Darren Ellis and Fiona Williams**

As Josh Mehlman points out in 'The Digital Divide' (see page 68), there is a distinct gap between those who own PCs and those who don't, and that gap continues to widen. A common complaint is that PCs are too complicated to learn to use, but the main obstacle to people buying PCs and getting connected is the simple fact that PCs are very expensive.

There is never a good time to buy PCs, but some prices have dropped with the introduction of the GST, making now as good a time as any. You can find cheap deals with reputable sellers starting from about \$1,000 for a brand-new PC.

If you find parting with a lump sum of up to \$2,000 a little daunting, you should look into the various special deals and payment plans available. Most of these are available through major retailers and manufacturers, but the NSW ALP and NSW Labor Council recently launched a PC deal called Get On Board. This allows union and ALP members to buy a Gateway Neo (reviewed on page 81) for \$9.95 per month for 36 months. Optional extras include a printer for \$1.50 per month and unlimited Internet access (using FreeOnline) for \$2.50 per week.

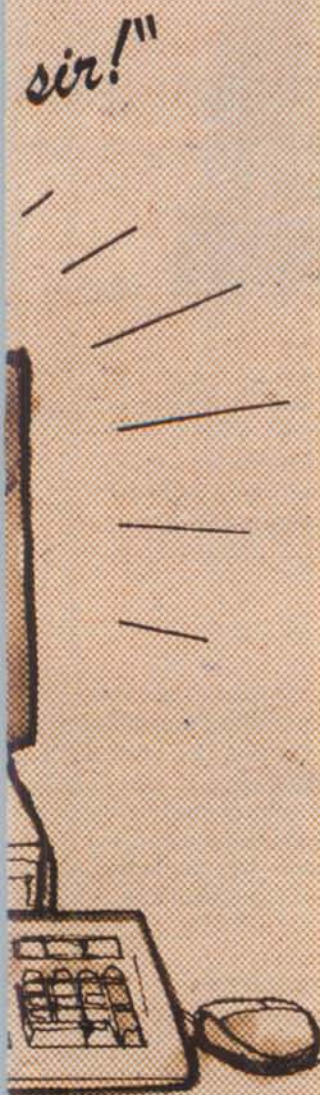
The deal follows the success of the Virtual Communities project launched last November, which began by offering ACTU members a PC and Internet deal. It has since been extended to the general public, and Get On Board could follow the same path.

Instead of paying a weekly sum, nothing could be better than paying zero, right? Maybe not. In the last couple of years, the 'free PC' model has emerged (for extensive coverage see *NewsWire*, at <http://newswire.com.au/>). The idea is that your PC purchase is subsidised if you commit to a certain period with a particular ISP for Internet access. This is a similar model to mobile phone deals, where you pay little or nothing for the phone but are tied to a particular service provider for a fixed term. 'Free PC' deals are not popular, perhaps because people are wary of entering into long contracts while PC and Internet access prices keep falling.

If you want to own your own system sooner rather than later, but don't want to spend too much, the range of machines in this roundup should be perfect for you. The price ceiling for this feature was \$2,000, and a minimum of 64M of RAM and Windows 98 was specified.

Two things are apparent when looking at the specifications for these systems, especially compared to the budget systems reviewed in last year's Christmas PC review (see APC December 1999, page 88). First, even taking into account that all the budget systems reviewed in December were under \$1,500, you don't get much more for your money than you did eight months ago. Second, the Intel 810e chipset is still a favourite motherboard for budget systems.

Scanning the specifications this time around, a 64M SDRAM system with a 500 to 533MHz Celeron is the norm. In the last budget review, APC reviewed 400 to 500MHz Celeron systems, which indicates that the increase in speed of budget PCs has been only marginal.



the cheap

Apple iMac

This is the latest version of the base model iMac. It's available only in blueberry; the more expensive iMac DV comes in the full range of flavours.

Since its release two years ago, the iMac (winner of APC's Product of the Year in 1998) has been controversial and highly successful. The basic iMac has had some major improvements on its 1998 specifications. It now comes with a 350MHz PowerPC G3, 64M of RAM and a 8G hard drive as compared to a 233MHz G3 processor with 32M of RAM and a 4G hard drive when it was originally launched.

The iMac was the first legacy-free system on the market. People either loved or hated

the lack of parallel ports, serial ports and floppy drive, but once again Apple was prescient. The legacy-free computer is becoming the norm, and most manufacturers are ditching ISA, serial and parallel ports. One of the four USB ports (two on the keyboard, two on the side of the unit) is taken by the keyboard and mouse. Tests indicate that Mac USB systems are more stable than PC systems for connecting devices in a daisy chain pattern.

This system is nowhere near as funky or powerful as the iMac DV, which is the next step up in the iMac range, but it has enough oomph for most people's needs. It's a great entry-level unit, at a palatable price.



Contact	Apple
Phone	13 36 22
Online	http://www.apple.com.au/
Price	\$1,861
In short	Excellent for home, school or small business computer users looking to dabble in Mac.

Compaq iPAQ

The Compaq iPAQ has enough features and functions to make it ideal for small business or the home. The unit we reviewed is one of the legacy-free models (there are other iPAQ models that have some legacy features). Often manufacturers use the term 'legacy-free' for systems that do away with ISA but still have serial and parallel ports, but this model has absolutely no legacy support at all. No ISA, no serial, no parallel, no PS/2 — just USB.

There are five USB ports: three at the back, and two at the front. The keyboard and mouse take up two of these. It would be better if an adaptor was provided so that



the keyboard and mouse only took one port, but three free USB ports is still one more than most systems.

The casing is an attractive black and silver. Inside, it has a Celeron

500MHz processor, 64M of SDRAM, a 4.3G hard drive and a DVD-ROM drive (another iPAQ model has twice the SDRAM and hard drive capacity). As with the Gateway Neo, you can't get into the casing without a fight.

The DVD bay functions much like a bay on a notebook; you can put in another hard

drive, SuperDisk or CD-ROM to suit your needs. It usually ships without a monitor, but APC used a 15in Compaq CRT, which is included in the price.

This system was outperformed by the Pioneer (which had a faster processor), but its overall performance was satisfactory, and it represents good value for money.

Contact	Compaq
Phone	1300 368 369
Online	http://www.compaq.com.au/
Price	\$1,364
In short	A good-looking machine that is cheap and performs well.

Gateway Neo

The Gateway Neo has a 400MHz Celeron processor, 64M of SDRAM (which, like that of the Compaq iPAQ, is not user upgradable) and a 4.3G Ultra ATA/66 hard drive. In many ways the specifications for the Neo are similar to the iPAQ, but it looks more like the Apple iMac. The Neo Gateway would be a reasonable clone of the iMac, if it weren't so beige, heavy and unwieldy. Still, it's good to see a large manufacturer giving it a go.

APC first looked at this system in the December 1999 budget PC review (in the under \$1,500 category). Not a lot has changed at the lower end of the PC spectrum in the past eight months. Originally, the Neo cost \$1,299, and this price hasn't

changed, even after GST. The specifications were average in December, and are just below average today.

The system is still a decent purchase with its current specifications, and its price is about right compared to the other machines reviewed here. Aimed at first-time buyers, the Neo has features to help you get started and accustomed to the system, including step-by-step tutorial videos to familiarise you with the machine and hook you up to the Internet.

Its performance was stable across the board. APC was unable to test the system with the new benchmarks, so the test results listed on pages 85 and 86 are not complete. It's nowhere near the fastest or



best system here (the iPAQ beat it on most counts), but it performed well considering its configuration.

Contact	Gateway
Phone	1800 500 742
Online	http://www.gw2k.com.au/
Price	\$1,299
In short	Heavy and not pretty, but certainly cheap and compact.

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Norton AntiVirus 2000: keeps all virus away from your PC
Norton Ghost: cure most technical support problems simply
by rebuilding the entire Windows system

For Intel FC-PGA Coppermine
& VIA Cyrix Joshua!!!
32 Vcore Settings!!!

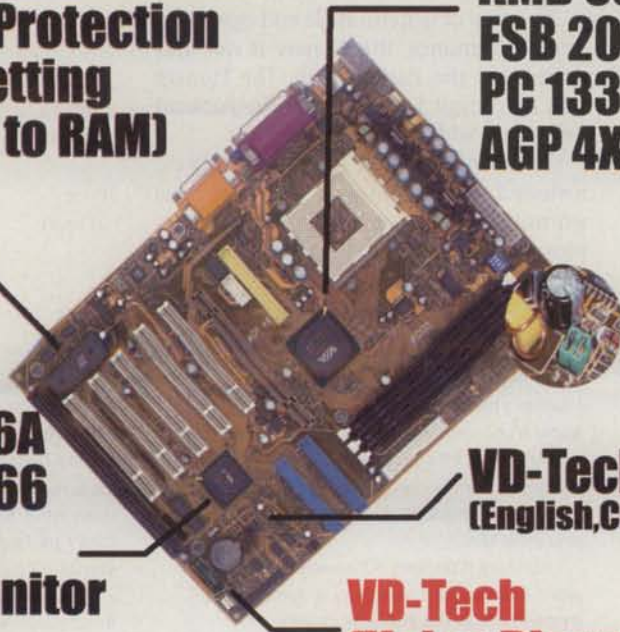


SL-02A++ C-Tune
FC-PGA & PPGA Adapter

SL-75KV-X

BIOS Writing Protection
BIOS Vcore Setting
STR(Suspend to RAM)

VIA VT8363KT133
AMD Socket A Processor
FSB 200 MHz
PC 133 SDRAM/VCM
AGP 4X Mode (AGP Pro Slot)



VIO Select
(3.3V, 3.4V, 3.5V, 3.6V)

VIA VT82C686A
Ultra ATA 33/66
AC'97 Sound
Hardware Monitor
4 X USB port

VD-Tech language Select
(English, Chinese, Japanese & Spanish)

VD-Tech
(Voice Diagnosis Technology)


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FAX: (03) 9544 4299


Soltek Computer Inc.
www.soltek.com.tw

Packard Bell Club 533C

Of the five PCs reviewed, the Packard Bell Club 533C represents the best value for money in terms of extras, especially for people buying their first computer or looking for a complete package for the home. The system comes with more than 20 software titles, including Microsoft Word 2000 and Norton AntiVirus. You can power it up and start using it straight away, without spending time and money on purchasing basic software packages.

Club 533C is all curves and contours; it looks great on the desktop. Ergonomic design has also been considered, right down to the rollerball mouse, which is large enough to fit comfortably in your hand.

The Intel Celeron 533MHz processor doesn't quite match the speed of the Pioneer's 650MHz Athlon AMD processor, but is sufficiently speedy for home or small business use. It also features a 10G hard disk, 64M of SDRAM, a Yamaha 744 soundcard and 128K of secondary cache. The graphics are provided courtesy of the Intel 810 chipset. It has an integrated 56K modem and the 15in monitor comes with speakers attached.

Considering all its features, the Packard Bell Club 533C is definitely a worthy investment for the home or small office, and the software extras make the initial



experience of buying and operating a PC less intimidating.

Contact	Packard Bell
Phone	(02) 9700 5052
Online	http://www.packardbell.com.au/
Price	\$1,988
In short	Good performance and lots of extras at a budget price.

Pioneer 2000 K7-650

The Pioneer 2000 packs a mean punch for its price tag. It's the only system we looked at with a 650MHz processor (an Athlon AMD K7). For \$1,500, the system boasts a 10G Seagate Ultra ATA/66 hard disk, 64M of SDRAM and a 16M SDRAM nVidia TNT2 video controller chip. Capitalising on these features, the Pioneer 2000 put in a solid showing in all of the benchmarking tests, taking out top honours several times.

It has to be said that the package itself is no oil painting. The Pioneer 2000 K7-650 is a very basic computer overall, but this is to be expected when the price is so low.

However, there is a pleasant surprise beyond the boring beige facade. The

650MHz AMD K7 processor is a valuable asset, as demonstrated in the APC Labs tests, where it predictably took first place. Similarly, the Pioneer's nVidia TNT2 video controller chip easily outclassed the Intel 810 chipset graphics capabilities of both the Compaq and the Packard Bell.

In terms of general high-end operation and performance, the Pioneer is not that different to the Packard Bell. The Pioneer sells for almost \$500 less, but the Packard Bell comes with a lot more software.

The Pioneer 2000 K7-650 is the only PC reviewed with a two-year return to base warranty. All the other PCs carry a one-year warranty. The extra year would certainly benefit novice PC users.



Contact	Pioneer
Phone	(02) 9690 2888
Online	http://www.pioneercomputers.com.au/
Price	\$1,500
In short	An average-looking computer with above-average performance.

How we tested

APC Labs used a combination of the Ziff-Davis Winstone 99 and WinBench 99 suite of benchmark software, plus BAPCo SYSmark2000 from MadOnion.

Winstone 99 runs a suite of modern business and graphics applications, records how long a system takes to complete these tasks and gives an aggregate score.

WinBench 99 contains a set of sub-tests, designed to find out how fast each component of a system really is.

Business and High-End Graphics WinMark 99 measures the system's graphics performance of video tasks associated with common business applications as well as demanding multimedia and 3D applications.

Business and High-End Disk WinMark 99 provides a measure of how a system's hard disk

handles a load equivalent to the business applications used in the Business Winstone 99 test.

CPUMark 99 compares how fast the processor, memory and cache subsystems are.

FPU WinMark 99 is a 32-bit floating point processor test.

3DMark2000 tests 3D accelerators in a real world environment, designed to simulate the demands of games and applications.

SYSmark2000 is an application-based system test that returns a score based on a system's business productivity and Internet content creativity abilities.

Video2000 tests a machine's overall video capabilities. It rates functions such as rendering and video decoding. It returns four scores based on the video card's features, performance, quality and overall score.

APC Labs also ran **Expendable** timedemo, which not only counts the average frames per second (fps), but also reports on the minimum fps achieved. This minimum fps score is the most important, because it reflects the video card's performance when rendering complex scenes.

Information contained in this article is based on products and specifications supplied to APC by distributors at the time of writing. Readers should check current pricing and specifications with distributors.

These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. WinBench is a registered trademark of the Ziff-Davis Publishing Company.

Editor's Choice



Compaq iPAQ

Highly commended
Apple iMac

It may be a cross between an Internet access device and a PC, but the low-priced Compaq iPAQ is an excellent machine — perfect for people buying their first computer. The stylish casing would fit in easily on the desk in the office or in the lounge room. Like the iMac, it has no

floppy drive and absolutely no legacy options, but plenty of USB ports.

If Mac OS is more your thing than Windows 2000, then you can't go past the iMac. Its configuration has improved since APC last looked at it, and it has also come down in price. Overall, it's good value.

PCs under \$2,000: Results

Product	Business Graphics WinMark 99	Product	High-End Graphics WinMark 99	Product	High-End Disk WinMark 99
Pioneer	242	Pioneer	849	Packard Bell	11,133
Packard Bell	103	Gateway	334	Pioneer	11,000
Compaq	102	Compaq	321	Compaq	10,300
Gateway	98.8	Packard Bell	295	Gateway	7,740
Product	Business Disk WinMark 99	Product	CPUmark 99	Product	FPU WinMark 99
Pioneer	3,310	Pioneer	58	Pioneer	3,557
Packard Bell	3,127	Packard Bell	38.3	Packard Bell	2,987
Compaq	3,145	Compaq	37	Compaq	2,670
Gateway	2,110	Gateway	29.2	Gateway	2,110
Product	Business Winstone 99	Product	3DMark2000	Product	Video2000: overall score
Pioneer	23.4	Pioneer	2,096	Pioneer	1,678
Compaq	20.7	Packard Bell	Did not run	Packard Bell	Did not run
Packard Bell	17.7	Compaq	Did not run	Compaq	Did not run
Gateway	16.2	Gateway	Did not run	Gateway	Did not run
Product	SYSmark2000	Product	Expendable: lowest fps	Product	Expendable: average fps
Pioneer	111	Pioneer	30	Pioneer	63
Packard Bell	82	Compaq	14	Compaq	29
Compaq	68	Packard Bell	13	Packard Bell	25.3
Gateway	Did not run	Gateway	Did not run	Gateway	Did not run

PCs under \$2,000: Specifications

Product	Apple iMac	Compaq iPAQ	Gateway Neo	Packard Bell Club 533C	Pioneer 2000 K7-650
Phone	13 36 22	13 23 93	1800 500 734	(02) 9700 5052	(02) 9690 2888
Online	http://www.apple.com.au/	http://www.compaq.com.au/	http://www.gw2k.com.au/	http://www.packardbell.com.au/	http://www.pioneercomputers.com.au/
Price	\$1,861	\$1,364	\$1,299	\$1,988	\$1,500
Processor	PowerPC G3 350MHz	Intel Celeron 500MHz	Intel Celeron 400MHz	Intel Celeron 533MHz	AMD K7 650MHz
Secondary cache (K)	512K	128K	128K	128K	256K
Tested/maximum RAM (M) and type	64M SDRAM/768M (max)	64M SDRAM (not user serviceable)	64M SDRAM (not user serviceable)	64M SDRAM/512M (max)	64M SDRAM/768M (max)
Hard disk drive	8G Ultra ATA	4.3G Ultra ATA/66	4.3G Quantum Ultra ATA	10G Ultra ATA	10G Seagate Ultra ATA/66
Hard disk controller	IDE	Intel 82801AA bus master IDE	Intel 82801AA bus master IDE	Intel 82801AA bus master IDE	AMD-756 bus master IDE
Hard disk file system	HFS	FAT32	FAT32	FAT32	FAT32
Graphics card	ATI Rage 128	Intel 810 chipset	Intel 810 chipset	Intel 810 chipset	nVidia TNT2 64
Video bus type	AGP	AGP	AGP	AGP	AGP
Video RAM	8M SDRAM	4M of system RAM	4M of system RAM	4M of system RAM	16M SDRAM
Video controller chip	ATI Rage 128	Intel 810 chipset	Intel 810 chipset	Intel 810 chipset	nVidia TNT2
Graphics driver name and version	N/A	5.11.01.0133.3	4.11.01.1321	4.11.01.1272	4.11.01.0208
Monitor	15in	15in Compaq	15in	15in Packard Bell	15in Diamond View
Tested resolution/colour depth/refresh rate	1,024 by 768/16 bit/85Hz	1,024 by 768/16 bit/85Hz	1,024 by 768/16 bit/85Hz	1,024 by 768/16 bit/85Hz	1,024 by 768/16 bit/85Hz
CD/DVD-ROM drive	24x CD-ROM	DVD-ROM	40x CD-ROM	40x CD-ROM	40x CD-ROM
Soundcard	Built-in Harmon Kardon Odyssey	Intel 810 chipset	Intel 810 chipset	Yamaha 744	Creative Vibra 128
Speakers	Built-in Harmon Kardon Odyssey	Integrated speaker	Integrated speakers	Monitor mounted speakers	Multimedia speakers
Modem	56K internal	No	56K integrated	56K integrated	No
OS available	Mac OS	Windows 2000	Windows 98	Windows 98	Windows 95/98, Windows NT 4.0, Windows 2000, Linux
Warranty	1 year RTB	1 year onsite parts and labour	1 year RTB parts and labour	1 year limited parts	2 years RTB
Bundled software and accessories	10/100 Ethernet connection	Intel 100 Ethernet connection	Microsoft Works 2000	More than 20 software titles, including Microsoft Word 2000 and Norton AntiVirus	Norton AntiVirus

Chips ahoy

It's proving to be an exciting year on the processor front. We have passed the 1GHz mark for PC processors, and are on the verge of seeing new architectures designed to supplant the 32-bit processors that have reigned supreme for the last decade. **Nathan Taylor** checks out what the major manufacturers have in the pipeline.

In the last year, AMD and Intel went all out, moving their schedules up dramatically in a bid to be first to release a 1GHz processor. In the end it was a close finish, but the tactic has come back to haunt both companies. Intel in particular has been unable to meet demand for its top-tier processors as a result of the early release. Normally, Intel builds up a stockpile before unleashing a new product, but spooked by AMD's ability to increase the clock speed of the Athlon, Intel behaved rashly.

Intel has also been having yield problems, and it seems that AMD currently has the best process technology. AMD is already using copper on some of its 0.18-micron chips, giving it quite a bit of room to increase the clock speed of its chips. Intel, on the other hand, has been struggling to get decent yields on its high-end chips with the integrated cache. Intel still has the advantage in the server space, with support for massive caches and multiprocessors, but AMD should have server processors late this year or early next year.

Intel plans to overtake AMD with the release of several new architectures this year. It will finally drop the five-year-old Pentium Pro (P6) architecture from all its product lines and replace it with the Pen-

tium 4 (P68) and Itanium (P7) architectures. The P6 will be around for some time, especially for notebook and Celeron processors, but it should be on its last legs by mid-2001.

Meanwhile, low yields for high-speed PowerPC processors are causing problems for Apple. Six months ago, Apple was all bluster and bravado, but this is no longer the case. As the G4 struggles to go far beyond 500MHz, the PowerPC is being left behind. Expect future Apple advertisements to focus less on performance and more on system design and style.

PowerPC manufacturer Motorola has some tricks up its sleeve, but they may not be enough to bridge the gulf that has opened up between x86 and PowerPC. In any case, Motorola has already planned its exit strategy from the PC processor market: it has announced that it will focus on embedded processors.

While the big three shoot it out, Sony is taking the technology it developed with Toshiba for the PlayStation2 and is trying to make a platform out of it. Startup Transmeta has an ultralow-power chip that has begun to make waves. Sun is gearing up for the launch of the UltraSPARC IV and MAJC chips.

An interesting year indeed for PC processors.



Intel's consumer processors

Intel is focusing on a new processor, the Pentium 4 (formerly codenamed Willamette), to be released towards the end of the year. The other new processor architecture to be released this year, or early next year, will be the low-end Timna processor.

Of course, the Pentium III and Celeron processors will continue to increase in speed. It's hard to pick where Intel will go with Pentium III, because it's already ahead of schedule, but it expects the Celeron to reach at least 700MHz by the end of the year. It has also recently released an updated version of the Celeron, which supports the full set of Pentium III (mainly SSE) instructions.

The basics

The primary design goal with the Pentium 4 has been to improve clock speed. Intel hopes this new architecture will solve its manufacturing yield problems for high-end processors. Design improvements should be able to push the Pentium 4 processor to 1.5GHz and beyond. Intel is expected to launch a 1.3GHz Pentium 4 processor at the end of this year.

According to processor analyst Hans de Vries, the Pentium 4 processor probably won't be as fast, clock for clock, as the enhanced (Coppermine) Pentium III on existing code. The Pentium 4 is very particular about the way it receives instructions, and it can stall if it doesn't get them in order. If the code is specially developed and compiled to best use the processor's architecture, the Pentium 4 should be faster than the Pentium III. As most code is still 386 compiled, few commercial applications will be optimised for Pentium 4 in the near future.

The Pentium 4 might have a lower performance per clock, but its increased clock speed capacity should more than compensate for this. But if the Pentium 4 processor does run slower than a Pentium III at the same clock speed, the performance advantage of AMD's Athlon will increase. Technically, an Athlon and Pentium 4 processor running at the same clock speed have the same peak performance (both can retire three instructions per clock cycle), but de Vries believes the Athlon is better suited to executing existing code. Intel had better hope it can ramp the clock speed of the Pentium 4 faster

than AMD can with Thunderbird.

A mobile version of the Pentium 4 will appear mid to late 2001, when Intel starts using its next-generation manufacturing technology to produce 0.13-micron chips with copper interconnects.

All that's really known about the Timna processor is that it will integrate the graphics synthesiser and memory controller onto the main processor, to lower costs and suit small form factors. The graphics engine's capabilities are unknown. Intel does not have a good record for integrated graphics. Its audio capabilities are also unknown, but we expect Intel to push software audio. Initially, Timna should run at 600MHz, and its primary market seems to be extremely low-cost PCs and set-top style devices.

Inside the Pentium 4

The Pentium 4 core (known as the P68) could be Intel's last IA-32 design, but a number of Intel processors based on that core are planned for release over the next few years. It features a very long pipeline, enabling the processor to reach much higher clock speeds than the Pentium III (based on the P6 core, originally designed for the Pentium Pro).

A processor's pipeline determines the number of stages it takes to execute a particular instruction. Usually, the more stages a processor has, the less it has to do in each clock cycle at each stage, and the higher the clock rate can be driven. The downside of a longer pipeline is the high cost of branch misprediction. Normally, if there's a dependency ('execute instruction A only if instruction B produces this result'), a processor has to wait for the execution of the first instruction to finish before executing the dependent operation. Modern processors do not wait. They guess which branch to take and execute the instruction anyway. However, if they guess wrongly, they have to flush the entire pipeline and start again, stalling the processor for as many clock cycles as there are pipeline stages.

The Pentium III's basic instruction pipeline has 10 stages. The Pentium 4's consists of twice that, but many of those stages are formed of elongated fetch and reorder functions. To counteract the effect of a branch misprediction, Intel has enhanced its branch prediction unit with a system



Intel's consumer Pentium III 'Coppermine' in Socket 370 format

originally introduced into the Alpha processor by Digital.

Intel has also introduced a double-pumped arithmetic logic unit (ALU). Many people think that the ALU component of the pipeline runs at twice the clock speed of the processor. It doesn't exactly; it moves instructions two stages with each clock cycle, rather than one, effectively doubling the throughput of instructions. In practice, the two ALUs in the Pentium 4 processor operate as four. By comparison, the Pentium III has two integer units and one floating point unit, and can retire a maximum of two instructions per clock cycle.

Another enhancement to the processor is the Trace Cache. Like the P6, the P68 is fundamentally a RISC CPU with a CISC decoder attached to the front end. The P6 takes x86 code and converts it to RISC-like micro-operations before execution. However, the Pentium 4's Trace Cache has a dynamically built table of pre-decoded instructions, obviating the need for the decoding part of the pipeline.

It also provides extensions to the SSE instruction set, which was originally introduced with the Pentium III. SSE2 has some relatively minor improvements on the existing instruction set. It takes the MMX instruction set and incorporates it into the 128-bit SSE unit. Previously, MMX could only operate on a pack of data 64-bits long; it could execute four 16-bit operations in parallel. Now it can execute eight. Another improvement to SSE is the support for double-precision (64-bit) floating point operations. It can operate on two such numbers at once.

The Pentium 4 will run on a quad-pumped 100MHz (equivalent to 400MHz) data bus, capable of 3.2G per second memory access speeds. This is why Intel wanted to move to RAMBUS memory. However, it looks like Intel will now support DDR SDRAM in its chipsets as well. It also uses a new socket type (423-pin socket) and will



Intel's workstation and server

Releases of Intel's Xeon processors have typically trailed those of the Pentium III. The main differences between a Pentium III and a Xeon are in the management features and the much larger cache of the Xeon.

Intel only recently started using the 'Enhanced' Pentium III (Coppermine) core in the Xeon processor, and the Xeon still trails the Pentium III in clock speed. Newer Xeons based on the Coppermine chip have a level 3 cache, because the level 2 cache is on-chip.

Early next year, Intel plans to release a chip codenamed Foster. It will have the same core as the Pentium 4, but a larger cache. Foster is also rumoured to use the Merced memory bus and incorporate Intel's Next Generation IO, which is the company's preferred successor to the PCI bus. Little is known about what will follow Foster, but a successor by the name of Gallatin could incorporate a very large on-die cache and will probably be manufactured on a 0.13-micron process.

The real action will happen when Intel releases its first IA-64 processor. The long-awaited Itanium (formerly known as Merced) should appear late this year. The first samples of the processor were sent to a small group of OEMs last August, and a much larger prototype distribution occurred in March and April this year.

Itanium is the first processor to use Intel's new instruction set architecture (ISA), called IA-64. To best implement IA-64, Itanium uses what Intel calls EPIC (explicitly parallel instruction computing), which is basically a very long instruction word (VLIW) architecture that allows a software compiler high levels of control over the operations of the processor's various functional units.

Initially, Itanium's clock speeds will not be as high as those of the Pentium III or Willamette, but it will be able to retire far more instructions per clock cycle. According to Intel, it will potentially execute 20 instructions per cycle. Willamette can execute three.

There are already a least five operating systems running on the platform, but 64-bit Windows and Trillian Linux are heading the bill. There are also operating systems

from Hewlett-Packard (HP-UX), Novell (Modesto), IBM and SCO (Monterey).

Itanium incorporates compatibility modes supporting IA-32 (standard x86) and Hewlett-Packard PA-RISC instructions, but they don't run as fast as native IA-64 instructions. You can install an Itanium processor on any 32-bit x86 PC operating system (such as Windows 2000), with the proviso that Itanium will not run any 16-bit or 8-bit applications (such as most DOS apps) natively. It will be interesting to see how much code in the new operating systems will be 64 bit. Will the 64-bit version of Windows be an IA-32-based OS that can

run IA-64 applications? The version of Linux coming out of the Trillian project will certainly be native IA-64, but it will also be able to run Linux apps compiled for IA-32 architectures. Little information is available on either of these projects.

Inside Itanium and IA-64

EPIC's most distinctive feature is its support for *templates* that designate instruction dependencies. Instructions are delivered to the processor in bundles of three, with an additional field in each bundle (the template). This points to other bundles that might be executed in parallel, or provide *prefetch* hints for speculative memory loads and branch instructions. Other processor features revolve around enhancing the throughput of instructions to the processor to keep its functional units as busy as possible. All variations of the processor will come with massive register counts and cache memories.

The original Itanium has two integer, two memory, two floating point and three branch units. It can examine and disperse two bundles (or six instructions) at a time. The practical throughput will be much greater than the Pentium III's peak of four calculations per cycle using SSE.

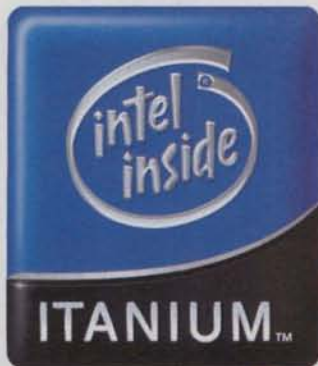
Manufactured on Intel's 0.18-micron process, the Itanium should debut at 800MHz at the end of this year. Early reports indicate that it will be available in a cartridge form with 2M or 4M of level 3 cache. In conjunction with the launch of the

processor, Intel will announce the 460GX chipset, a four-processor set supporting 66MHz/64-bit PCI and dual memory ports. This will provide a total of 4.2G per second of memory bandwidth and will use SDRAM. Prices are yet to be announced, but with its designation as a server/workstation processor and its huge cache, it's sure to be extremely expensive.

Ironically, the Itanium may have a very short shelf life; its successor, code-named McKinley, is due for release at the end of 2001. Little is known about McKinley at this stage. Intel officials claim it will be twice as fast as the Itanium, and will have an expanded resource base: more execution units and more load/store units. However, it will be binary compatible with Itanium. EPIC supports chaining, so processors with more execution units can disperse as many bundles as needed to fill its units. It will also support the same bus protocols and power delivery technologies as Itanium. Presumably, it will go into an Itanium motherboard.

Beyond McKinley, Intel's plans extend to the Madison processor, an enhanced version of McKinley manufactured on a 0.13-micron process. It will be faster and capable of using a larger cache. Madison is due for release in mid-2002, and will be accompanied by the release of the 870 chipset. The capabilities of 870 are unknown and are likely to change with Intel's current infrastructure issues.

Consumers may get their first taste of IA-64 in late 2002 with the introduction of the Deerfield processor. All we know about Deerfield is that it is aimed at a price-conscious market. It will probably have a smaller cache and be much cheaper than other IA-64 processors.



The Itanium processor has been a long time coming.



The current server processor, the Pentium III Xeon



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AMD

AMD has recently taken a similar approach to Intel. It has the working Athlon core, but believes that by playing around with the cache it can achieve higher performance, increase yield and target its markets better.

On June 5, it launched a range of new processors, all based on the Athlon core but containing various cache changes. The first of the range is the new set of integrated-cache Athlons, formerly known by the codename Thunderbird. These processors, starting at 750MHz and going up to 1GHz, will form the mainstay of the Athlon performance line of processors.

AMD does not use a special nomenclature for the enhanced Athlons, meaning there's no easy way to distinguish between older Athlons with the external cache and newer Athlons with the integrated cache. Both are simply called Athlons. Buyers will need to be savvy enough to distinguish between the two (and hope that their retailer is). Presumably, AMD will phase out the older Athlons with the external cache, but there is sure to be some confusion in the meantime.

AMD's Celeron equivalent is the Duron, a trimmed version of the Thunderbird. Early test results show that it is slightly slower than the first set of Athlon

processors, but the difference is marginal: a few percentage points at most. AMD is sure to keep the inexpensive Duron several speed grades behind the Athlon, to ensure that Duron sales do not eat into those of the highly profitable high-end processors. At launch, the Duron was available at speeds of 600, 650 and 700MHz.

In the longer term, AMD plans to introduce Mustang, a new Athlon core. Mustang will allow AMD to compete directly with Intel's Xeon processor.

Next year will also see the release of a new core from AMD, known as Sledgehammer. The plan for Sledgehammer is to take the current x86 instruction set and expand it to 64 bits, but it isn't clear what the benefits of converting x86 into 64 bits would be. AMD has no plans to license the Itanium instruction set.

This leaves the K6-2 and K6-3, which still represent a significant proportion of AMD's sales. With the launch of the Duron, AMD will push them at the mobile market, for the development of very low-cost notebooks.

Inside the new Athlons

The key to the performance of the new Athlons is the integration of the level 2 cache onto the processor die, allowing the

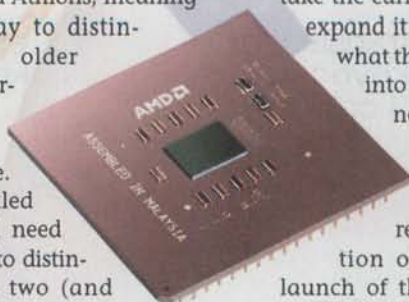


AMD's Athlon processor

cache to run at the clock speed of the processor. Previously, the cache only ran at a fraction of the speed of the processor. The integrated cache is smaller — 256K as opposed to 512K — but two or three times faster. The Athlon's large level 1 cache will remain intact, giving it a total on-chip cache of 384K.

The Duron also has a 128K level 1 cache, but only 64K in its level 2 cache. Apart from this, it is identical to the enhanced version of the Athlon. Both use a 200MHz Alpha EV6 bus for data transport to and from memory (but the Athlon will move to 266MHz later this year).

Mustang, a new core from AMD, is expected to be an enhanced Athlon core when it's released late this year or early next year. It can have a massive (1M or more) on-chip cache as well as a possible level 3 cache, similar to current Xeon processors. The main enhancement to the core appears to be the development of an improved branch-predictor. This should cut down on penalties involved in branch misprediction, and keep sustained transaction throughput high.



PowerPC

Nervous Apple executives are no doubt wondering whether they'll have to go looking for a new processor sooner than planned. At the moment, Motorola is facing the challenge of increasing the clock speed of the G3 and G4 processors used in all current Macintoshes.

The 750 core was originally developed for the G3 line of processors, and enhanced by the AltiVec SIMD instruction set for the G4 processors. Clock for clock, it's highly competitive with both Intel and AMD's products. The AltiVec instruction set in the G4 is a particularly well-executed example of a SIMD instruction set. However, even using IBM's copper manu-

facturing, Motorola is having trouble raising the clock speed of the G3 and G4 processors beyond 500MHz. Combined with low memory bandwidth in Apple systems, this has led to an ever-widening gap between x86 and PowerPC.

At last year's Microprocessor Forum, Motorola revealed it was pinning its hopes on a redesigned G4 processor (commonly referred to as the G4+). The main problem with the G3 (750) and G4 (7400) processors is the short pipeline, which restricts bandwidth. The enhanced G4 processors will have an expanded pipeline, enabling higher clock speeds. But per clock, the new processors may not be much faster than

the current crop.

By the end of this year, the G4+ is only expected to achieve speeds of about 700MHz. In the meantime, Intel and AMD may have pushed their processors up to 1.2GHz and beyond.

In Apple's favour, the low power consumption of the PowerPC does allow it to put fast processors in notebooks without being too concerned with battery life. Motorola plans to introduce new G3 processors targeted at the mobile market later this year. Called the 750CX and 750CXe, the new processors will reach 550 and 700MHz respectively, and will be used in a new line of PowerBooks from Apple. They will also use a 256K on-chip cache.

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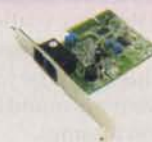
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Transmeta

Transmeta finally announced its Crusoe processor in January. The Crusoe processor should appear in notebooks and set-top boxes later this year. It won't be the fastest processor around, but it will probably use the least power.

The company has introduced some interesting technology. The first innovation Transmeta brought to the table was its code morphing software. At its core, Crusoe is a four-wide, 128-bit VLIW processor with an inbuilt software instruction translation engine.

Rather than having dedicated hardware for x86 instruction translation (as the P6 and Athlon do) Crusoe performs these functions in software, using the

same hardware that executes the translated instructions. In addition to translating x86 instructions to native VLIW instructions, the code morphing software also keeps a cache of frequently used translations, and will put more effort into optimising the translation of frequently used code.

The code morphing software also allows Transmeta to adapt quickly to new instruction sets. This means that eventually, users may be able to download a module to turn an x86 Crusoe into an Alpha Crusoe. It also allows Transmeta to update the processors with new instructions.

The other big advantage of Crusoe is its power consumption. Its fastest variant

runs at 700MHz and dissipates 1 watt of power, and will scale back clock speed if the higher speed is not needed. An Athlon running at the same speed uses 34 watts. The Crusoe is likely to be slower than the Athlon, but it is a lot more efficient. It could provide longer battery life for lighter notebooks, but don't expect too much. The processor is only one component in the power equation.

The Crusoe processor initially shipped in two varieties: the TMH3120, which runs at 400MHz and is targeted at Internet appliances, and the TM5400, which runs at 500, 600 and 700MHz. The TM5400 is designed for notebooks running Windows.

Sun

Sun's Microprocessor Architecture for Java Computing (MAJC) competes with Intel's IA-64. Sun has developed a smaller core to take advantage of both instruction-level and thread-level parallelism.

MAJC is a four-issue VLIW processor. VLIW architectures can be very fast and efficient, but they have suffered because high-level and compiled code is so implementation dependent. Code does not translate well between processors.

Sun is banking on the use of Java just-in-time (JIT) compilers to offset the code dependency of VLIW processors.

Sun also plans to integrate multiple cores into a single chip with MAJC. Rather than placing a single core on the silicon die, Sun has integrated multiple processors into the same chip.

Each MAJC core has four functional units capable of processing any type of data. This limits it to the retirement of four instructions per clock cycle, but because each unit doesn't distinguish between data types, it's more likely to reach its peak than most other processor architectures.

All these features add up to one mighty processor. A die with four cores on it retires 16 instructions (of any type) per clock cycle.

Compare this to current processors' one or two instructions per cycle (the Pentium III peaks at four using SSE). However, to achieve this rate, the multithreading system and software must be highly efficient.

Sun's UltraSPARC still spans at least two generations. A new process will enable Sun to introduce the UltraSPARC IV line of processors. There will be no architectural difference between these and UltraSPARC III, but new manufacturing technology will enable the processor to reach 1GHz by the end of the year. Sun also plans to launch a new architecture, UltraSPARC V, in early 2002. It will be introduced at 1.5GHz.

Sony

Sony plans to open the design to the PlayStation2, and to sell its Emotion Engine and Graphics Synthesiser on the merchant market. It has announced it is developing new workstations (called Creative Workstations) using the chipset in the PlayStation2, but this might be just hype. Most of these workstations would be used to develop PlayStation2 games.

Sony plans to sell the chips to developers of all kinds of devices — even those building a compatible competitive product. Expect to see PlayStation2-compatible set-top boxes on shelves next year. It is uncertain whether this will extend to PC-like devices.

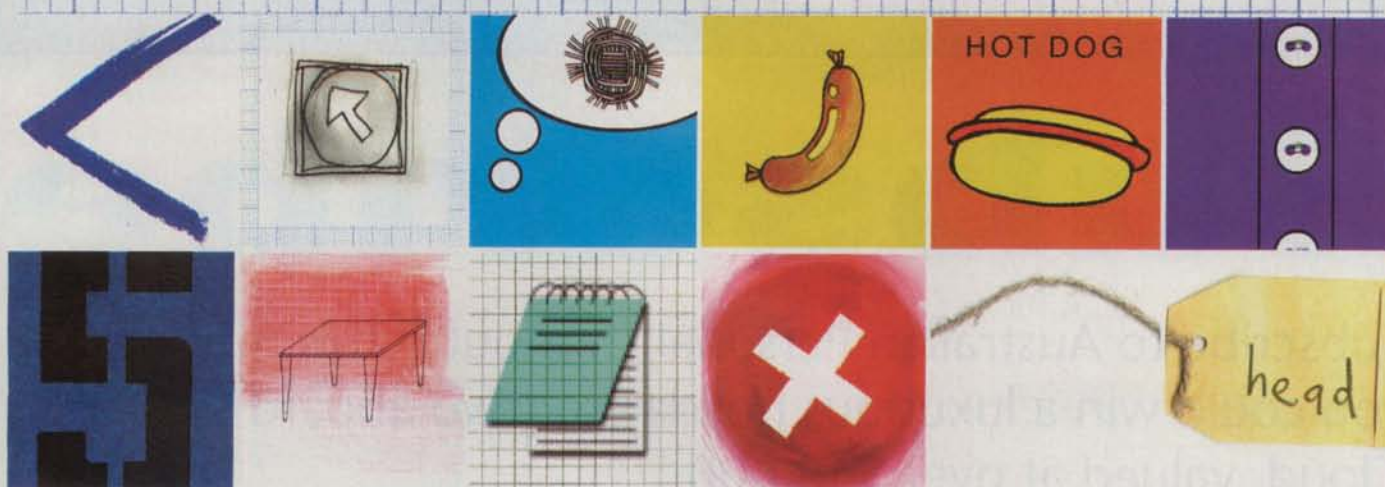
We'll also have to wait and see whether the Emotion Engine is good for anything other than 3D graphics. The silicon in the PlayStation2 runs at 300MHz, but cleverly uses SIMD units to achieve very high throughput on the vector calculations required for 3D graphics. It may not stand up so well to a lot of integer and double precision (64-bit) floating point calculations.

Sony and Toshiba might be able to increase the processor's clock speed on the current 0.18-micron process, but probably not by much. However, future processes will enable them to increase speed and reduce power consumption.

Sony's schedule for the chipset extends for at least two more generations. The current Emotion Engine has about 10 million transistors (similar to the Pentium III). The next-generation chip is slated to have 40 million, and is due for release in 2002/2003. The generation after that will feature 100 million, and should be released in 2005.

Future Graphics Synthesisers are expected to contain massive amounts of on-chip RAM. One chip Sony is looking at releasing has an immense 32M on-chip, using 287 million transistors, and should be capable of delivering a screen resolution of 4,000 by 2,000 pixels. ■

<table> Let there be site </table>



Times are getting tough in the HTML editing software market. To stand out, it's no longer enough to have table and frame buttons. How, then, do the current packages stand up? **By Alex Kidman**

It's not just that existing players are rushing to bring new features to market. No, the real threat to HTML editors comes from the 'save as HTML' options that a lot of software contains these days. Soon even instant messaging clients will let you save conversations as Web pages. Combine these packages with the Web sites that have inbuilt tools for Web page building, and you could be left thinking that the humble HTML helper's days are numbered.

Many of the inbuilt HTML options (such as those built into Microsoft Word) appeal to new HTML users, who don't want to worry about the code and are only interested in building simple pages. However, there's still a large community of coders who treat Web presentation as a business, and they need professional-level tools.

The market here is split between visual packages, such as Dreamweaver, which mainly work in a desktop publishing-style layout mode, and code packages, such as HotDog, which work to make the nuts and

bolts coding as quick as possible. HTML professionals know which end of a <table> tag is which, but they don't want to spend all day on fiddly details, especially ones that can be performed much more quickly with a package.

Most packages promote the robustness of their code, and while the browser market is still heavily fragmented, cross-browser code is more important than ever before. What looks great in Microsoft Internet Explorer 5 may look like a jumbled mess in Netscape Navigator, and refuse to render at all in Opera. Microsoft is most guilty here; Internet Explorer may be able to perform some nifty layout tricks, but it ignores many W3C standards. If IE had 100% of the market, it could get away with creating its own proprietary standards, as Microsoft does with its products in other markets. The fact is that it doesn't completely dominate the browser market.

The last time APC examined HTML tools (see APC August, page 94), the tests involved building a relatively complex site

to represent a hardware store. Now that other products include HTML editing features, the tests have taken a more tools-intensive approach, testing those areas where an HTML editor should stand out from the crowd (see 'How we tested' on page 101 for more details).

Ultimately, all Web site editors stand or fall on their code, and compatibility is not the only issue. Due to the flexible nature of HTML, it's possible to achieve the same results in a clean, fast way, or a slow, inconsistent way. Bad code slows pages and can affect browser performance. If you ask most Web designers to name a bad tool, chances are they'll rail against Microsoft FrontPage, not because it's hard to use, or lacking in features, but because it often produces convoluted code to achieve even simple effects. It's still popular among new users because it makes complex effects quite easy to use, as long as you like using IE. HTML editors are becoming less code-oriented, and even hardened HTML coders are taking a liking to visual programming.



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Adobe PageMill 3.0

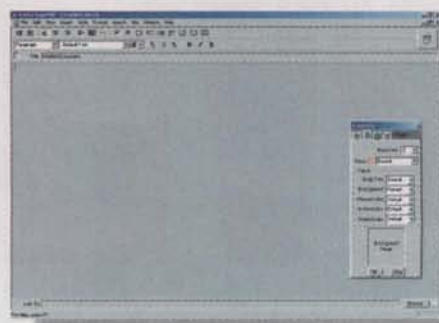
Following its acquisition of GoLive in 1999, Adobe now has two competing HTML editors in the same market: PageMill and GoLive. Version 5 of GoLive is due out later this year, and Adobe continues to push its PageMill editor. It's hard to see where Adobe is heading with PageMill, as progress seems to have stalled. This is the same release as APC reviewed last year, and many of the same criticisms apply.

PageMill's CD blurb states that it can easily import from your favourite office applications. APC's tests found Office 2000 isn't one of them. Selecting DOC files did launch Word, but PageMill was very confused by Word's HTML coding, marking each page with hundreds of little question

marks. It didn't rewrite the code, but it indicated that it did not understand what the code meant.

PageMill did work well with other Windows applications. Rather than launching them internally, PageMill redirects images and documents to their source application, and then works with the adjusted results. This is good if you prefer to do your creation elsewhere, but it does relegate PageMill to being an indexing utility.

PageMill would be a good introductory tool for learning about HTML and equally good for people who don't really want to learn HTML. It has an uncluttered interface, ubiquitous property inspector, and comes bundled with a copy of Adobe's Photoshop LE.



Contact	Adobe
Phone	1300 550 305
Price	\$196.90
Online	http://www.adobe.com/
In short	As an editor, PageMill has failed to keep pace.

Allaire HomeSite 4.5

APC wasn't impressed with HomeSite 4.0 last time we reviewed it, but major changes have been made in version 4.5.

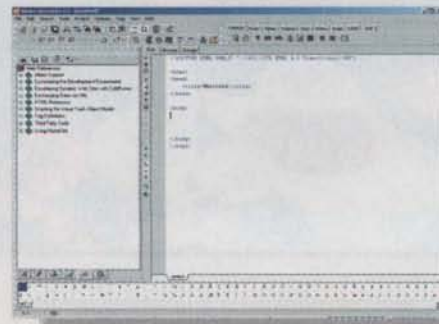
HomeSite still uses a switchable code/visual base, which makes it look like a cross between HotDog and HoTMetaL. The last time APC examined it, it was bundled with Dreamweaver. The connection is still there: when HomeSite was installed on a system that already had Dreamweaver, it was available as an option button within the program itself.

It performs most basic HTML functions without fuss or pizzazz. The same can be said of HomeSite's more complex functions, where DHTML and ASP functions are coded through some fairly rough dialogs.

HomeSite's code validation has also improved. Test Word HTML was displayed with plenty of angry red tags. HomeSite has an inbuilt code cleaner called Cleansweep that validates and rewrites code on request. The option can also be set to validate code as you go, and you can customise the validation settings. However, if Cleansweep crashes in mid-check, it leaves you with an HTML file full of error code and little else.

The package also includes TopStyle Lite, a CSS editor/creator. It's not the full version, but does add extra CSS features to HomeSite itself.

If the next release improves as much as this one has, HomeSite could well be a winner next time it's reviewed.



Contact	Firmware
Phone	(02) 4725 8000
Price	\$203.50
Online	http://www.allaire.com/
In short	Vastly improved. Will strongly appeal to HTML coders.

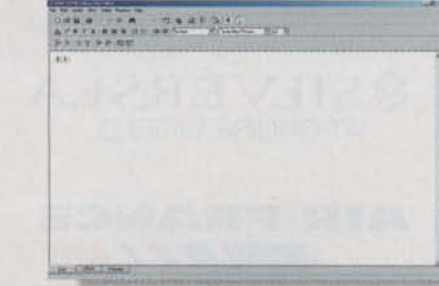
eziwebsite

Australian Windows Publishing claims that with eziwebsite "anyone can create a professional Web site in minutes". The catch is that the program must be registered to access core components, such as the ability to view your own HTML code. If you don't register, all you have is a wizard-driven template manager. eziwebsite's templates differ from most other packages as they look fairly good, but the preview window for them is far too small, which means you have to build (and rebuild) your site until you find a design you like.

Once registered, you can access the main HTML editing window. This is relatively simple, and is similar to earlier versions of Netscape Composer.

When launched, the program automatically starts in site wizard mode. There's no simple way to open an HTML page and begin editing. eziwebsite uses its own file format for 'sites', which means it's not very practical for editing existing HTML sites. This can be overcome by locating the executable file that does the actual editing (awphtml.exe) and running it, but a beginner may not have the patience or experience to undertake that level of searching.

This is a very rudimentary Web site editor. Irritating factors, such as compulsory registration, put eziwebsite down towards the bottom of the pile. It's acceptable for beginners, but they'd soon outgrow it. Similar and better programs can be had for free.



Contact	Australian Windows Publishing
Phone	(02) 9760 0600
Online	http://www.awp.com.au/
Price	\$88
In short	Feature-poor and limited.

<key>



Macromedia Dreamweaver 3.0

Dreamweaver has always led the field, and Macromedia has improved upon it in subtle ways for the 3.0 release.

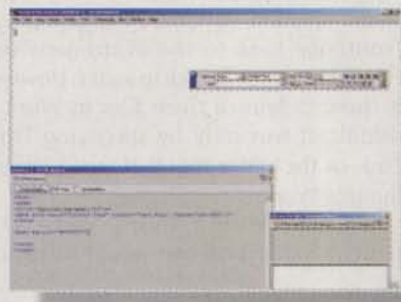
Dreamweaver did exceptionally well at rendering the test site. It was very good at cleaning up the Word HTML, which enabled it to pick the original version (Word 2000) and present a list of what it had cleaned. The cleaned files were smaller, and displayed consistently in IE and Navigator.

It was easy to quickly arrange the site using Dreamweaver's site-building tools. All we had to do was define local and remote sites, set a home page and create the links. This approach created an index page with a list of links that could be

changed to suit our visual style. Recursive links can be copied to the index page and then applied across a group of documents. This is a definite time saver.

Dreamweaver's code writes cleanly across most browsers, and it has a lot of add-on features, such as imagemaps, easy options for the creation of DHTML effects, and the precise location of elements through layering. It can be a little processor-intensive, especially when first launched, but with the amount of options available, this is a relatively small problem.

Dreamweaver is an exceptional HTML tool, as it is easy for new users to quickly pick up, but has the code complexities that Web design professionals demand.



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Microsoft FrontPage 2000

HTML beginners tend to find its Office style and feature set familiar, but hard-core code junkies tend to loathe FrontPage 2000. There hasn't been a new release of FrontPage since the last time APC examined Web editing tools, therefore, most of the same criticisms and compliments apply.

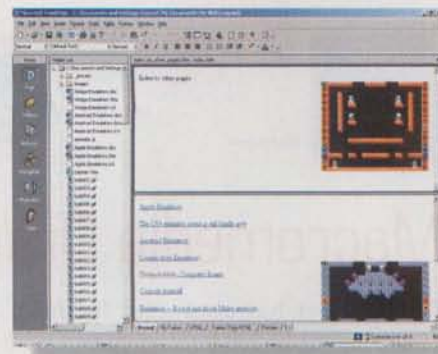
FrontPage is easy to use. The test site was created quickly, using little more than drag-and-drop plus a few menu-driven frame creation options. Not surprisingly, FrontPage took to the Word-generated HTML pages like a duck to water. However, it chose to launch these files in Word by default. It was only by specifying FrontPage as the editor that it stopped launching into Word.

When creating quick links, APC noticed that FrontPage would automati-

cally use the first sentence of the document instead of the document name as the link text. Some people may find this helpful, but in our tests it meant extra time re-editing the links.

FrontPage's code is often criticised. The code usually works, but its approach is unusual as it attempts to recreate an exact visual representation of what the user is doing, no matter what the code result is or if there's a simpler solution. The result is that you end up with a lot of redundant code — FrontPage seems particularly fond of ` ` non-breaking space tags where they aren't really needed. The completed site was bulky, some 700K larger than comparable sites.

FrontPage is good for beginners, but its unnecessarily complicated code will turn off advanced Web authors.



Contact	Microsoft
Phone	13 20 58
Online	http://www.microsoft.com/
Price	\$216, \$129 academic
In short	A powerful editor with some strange approaches to coding.

Namo WebEditor 4.0 (beta)

WebEditor is one of the better code-based programs APC has seen, combining a functional WYSIWYG interface with strong back up code. Some features, such as automated wizards for frames and buttons, weren't available when editing raw HTML, but otherwise we found little fault with WebEditor.

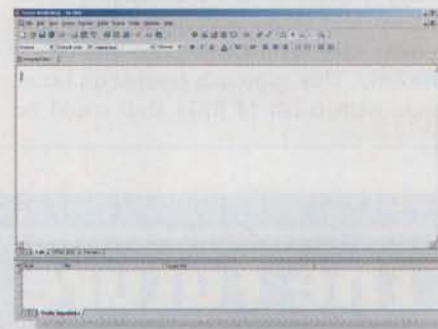
APC examined the beta release of Namu WebEditor 4.0, but the full release version should be available by the time you read this. The only major omissions in the beta were some help and clip art files.

Namo will appeal to novice programmers, as it has a lot of wizards, templates and quick and easy routes to page creation. Normally, automated features mean clunky code, but most of it was fairly clean,

cross-browser-compatible HTML. WebEditor could be a little sharper in the code validation area, as suspect code was simply rendered with large yellow question marks.

WebEditor was one of the faster editing packages, and makes rapid transitions between page and HTML views. It uses the same layout idea as packages such as HoT-MetaL and PageMill, where differing views are placed on separate tabs. You will need to have Internet Explorer 4 (or a later version) to preview without saving, but external Navigator previewing is available.

In keeping with the appeal to HTML novices, Namu has bundled screen capture and GIF animation packages with WebEditor, along with a selection of clip art.



Contact	Tradeplus
Phone	(03) 9890 0997
Online	http://www.namo.com/
Price	\$187 (full release)
In short	Great for HTML novices.

Sausage Software HotDog Professional 6.0

HotDog is code-centred, and Sausage has clearly aimed it at HTML writers who like it that way (Sausage refers to them as 'Gun Coders'). This is partly because Sausage sells a lot of HTML products, from simple page creation utilities such as HotDog PageWiz and HotDog Junior (see APC January, page 168) to the Pro package.

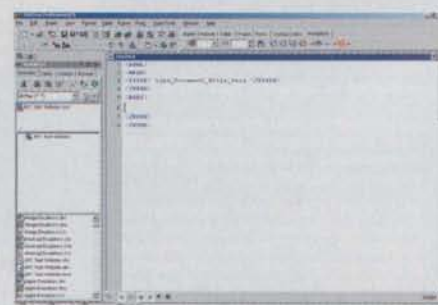
HotDog has a number of features aimed at creating and checking code. APC particularly liked its ability to find tags, and whisk you almost immediately to the concluding tag in the set. This is a tool with great potential for checking HTML errors.

Its own created code was very clean and stable, and rendered well across all browsers. It can check HTML according to

W3C (World Wide Web Consortium) guidelines, although it didn't pick anything wrong with the imported Word 2000 code, which was bloated but not incorrect.

Being text based, some tasks are trickier with HotDog than with other packages, most notably frame creation. Frames are set up using a visual wizard, but once done, you go back to a code screen.

Once loaded, HotDog is very quick. There are nods to WYSIWYG editors, such as the presentation of image thumbnails when the mouse hovers over an IMG tag, but Sausage knows the features that appeal to its market. HotDog is not the most novice-friendly package, but is very powerful.



Contact	Sausage Software
Phone	(03) 9662 2627
Online	http://www.sausage.com.au/
Price	\$US108.90
In short	Good, fast coding program.

SoftQuad HoTMetaL 6

HoTMetaL 5 can write clean code, but its user interface isn't too good for beginners. One release later, and the interface in HoTMetaL has been changed. Thankfully, it's been tweaked without losing any of the robust code of HoTMetaL 5.

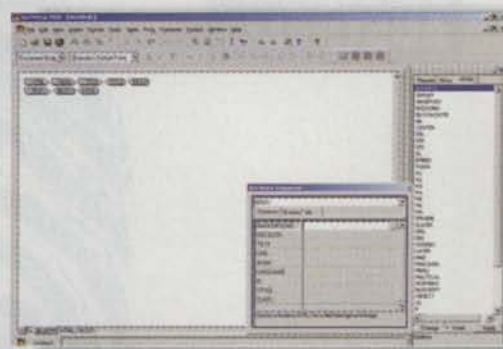
APC was presented with a couple of options when we created the test site. HoTMetaL 6 has an inbuilt business site wizard, which quickly lays out sample pages and then allows you to import content into them. There's a variety of styles available, but some of them are rather garish.

There's an option to build the site from scratch. When we tested it, this led to a few small problems. HoTMetaL has a very basic frame setup as far as WYSIWYG is concerned. Choose a frame style such as a

horizontal banner, and the frame is built. This makes multiple embedded frames harder to create.

Written code was extremely clean and rendered well in both browsers. When APC imported Word HTML code, it recognised that some things were wrong, but only made changes to the main <HTML> tag. HoTMetaL uses a property inspector for tags, much like Dreamweaver or HotDog, but HoTMetaL's inspector is a little basic. You must scroll down the inspector to reveal all possible attributes, which takes time.

HoTMetaL 6 is a good compromise between code and visual editing. It's a solid low-frills package that professional coders may well like to examine.



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Macromedia Dreamweaver 3

Highly commended Namo Web Editor 4

Dreamweaver is a model Web site editor. It's easy to use, powerful, and proves the theory that you can create pages in minutes, not hours. Its integration of both code and WYSIWYG editing has yet to be beaten.

Namo's WebEditor is a very easy-to-use product at an extremely attractive price. It's not as well laid out as Dreamweaver, but it's still a powerful tool.

How we tested

Most Web site designers are handed existing content and have to create a site around it. The last time APC reviewed HTML editors, our tests created a site from scratch, based around a hardware shop. This time APC's tests attempted to create a site from existing documents.

The tests were designed to check how quickly a site could be built around a single index page, using whatever features the editors had available. There's a delicate balance between essential features, and features that get used simply because they're in a browser. We

specifically wanted to test simple but often incorrectly designed elements, such as frames, as well as any higher level functions that were available.

Creating a site from existing content also provided a chance to check the HTML validation in many of the packages. To create the site, we started with 13 documents in Word 2000 HTML format and two images. Recoding HTML created by Word is a solid challenge to HTML editors, because of the poor quality of the code. If the code couldn't be imported, it was resaved from Word as TXT format.

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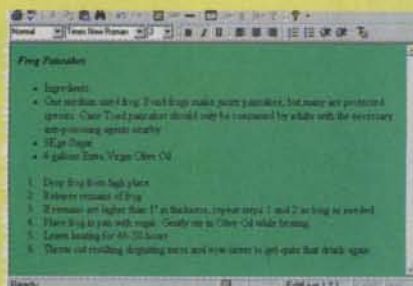
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Editing on the go

Ephox EditLive 1.2

EditLive takes a completely different approach to Web editing. It's not a standalone product, but a browser-based plug-in that allows for Web editing. It would be of most interest to Web site administrators who control the content that appears.

To install EditLive, you must run a simple executable file which adds the plug-in to both Internet Explorer and Netscape Navigator. EditLive runs more smoothly in IE than Navigator; pages load

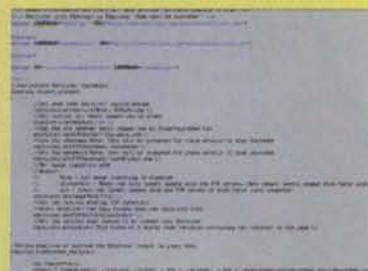


EditLive's strengths lie in customisable code.

more quickly, preview options work and colour backgrounds render properly. Ephox recognises that Navigator has problems with EditLive code, and this may be rectified in later releases.

EditLive's HTML toolset is relatively small. There are images, tables, text, and not much else. However, its approach to implementation is valuable. As it's a plug-in, it's necessary to embed it within a chosen page, and in doing so, administrators can pick and choose which editing options will be open to users. Image availability, editing styles, FTP use, and so on, can all be controlled.

Ephox claims that no HTML knowledge is necessary to run the product, which is true, but it needs to be set up by someone with both HTML and network skills. Variables are set in either JavaScript or VBScript, but the sample scripts on Ephox's Web site give a good indication of what variables need to be set, so it isn't that hard to rewrite one of these. It's quite easy to follow the scripts, and there is



A sample EditLive application

good sample handling in the code itself, so you're not stuck looking at variables you have no control over.

EditLive won't amaze people looking for the greatest Web toolset, but it does provide an interesting content management solution for Web administrators.

Contact	Ephox
Phone	(07) 3858 0100
Online	http://www.editlive.com/
Price	\$140
In short	A good concept for a plug-in; aimed at administrators, not content creators.

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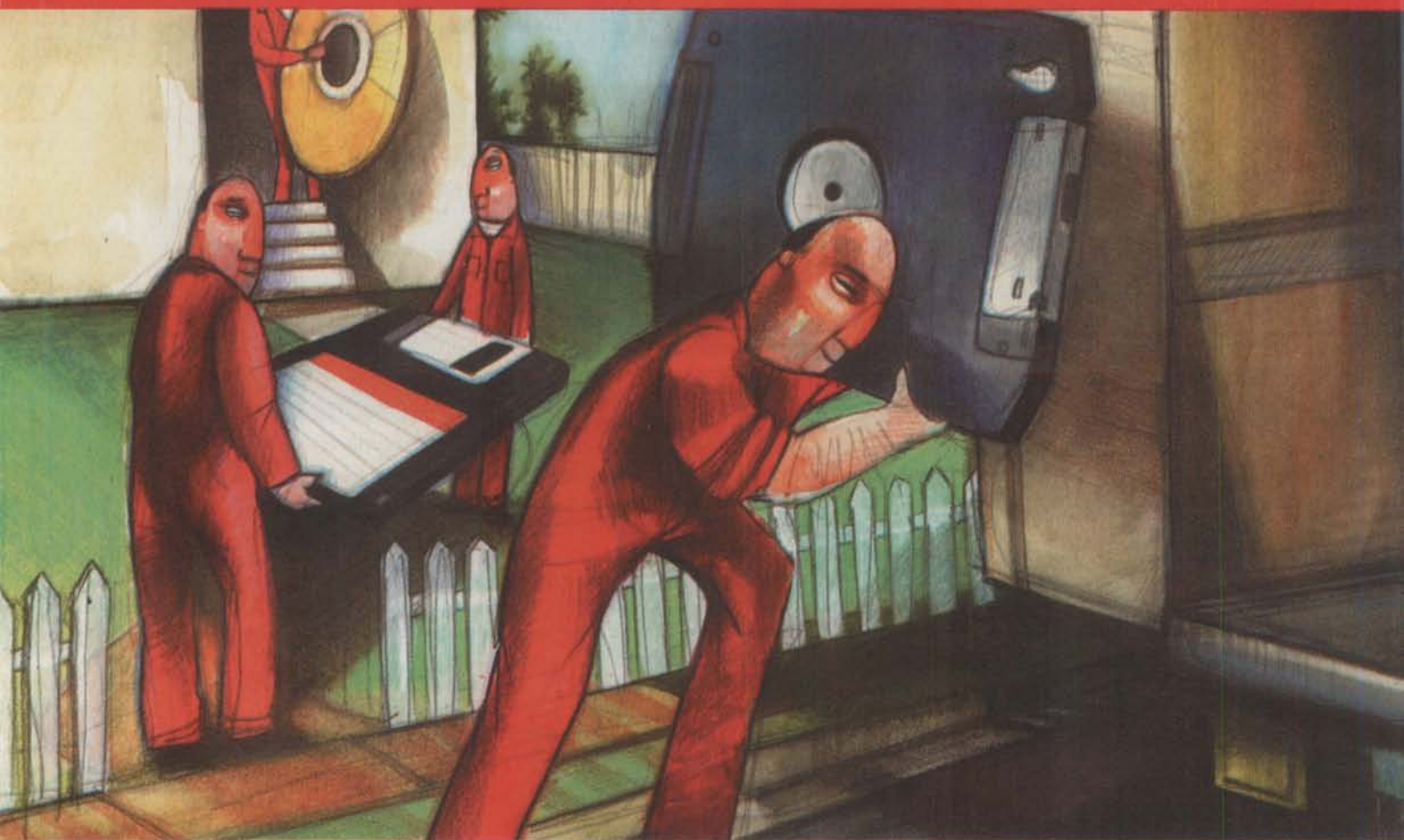
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REMOVABLE STORAGE



Walk it away

Removable media is often the best way to transfer files between computers or increase a system's storage capacity. But which kind should you buy?

Fiona Williams checks out the current crop of devices on the market.

Space is a highly prized commodity in computing. After installing typical office applications on a system, there's often not much space left. This is more apparent when you try to install a new application or download a file and are met with an 'insufficient disk space' error message. You've forked out for a top-of-the-range computer, only to find your space overrun by mammoth applications. If you want to keep the old as well as the new, and use your computer to its fullest potential for both work and play, you'll need to look elsewhere for extra space.

For the technophile, new hard disks are still probably the best way to increase the capacity of a system. It's possible to

get a 20G hard disk for about \$300, which translates to 1.5 cents per megabyte. Even the cheapest removable media costs three times that and you have to buy the drive, but you can't beat it for portability.

What can you do?

Your easiest option is an external removable storage device. There are several types of removable storage available, but the most popular method is disk technology. The 1.44M floppy disk is still a standard in computing, having stood the test of time as a durable means of storing and transporting small document files (see Technobabble, page 118). However, the humble 1.44M floppy doesn't quite make

the grade when you have large graphics files or entire programs to store. This is where removable storage disks, such as Iomega's Zip and Jaz drives, Imation's SuperDisk, Fujitsu's DynaMO and the Castlewood Orb, come into their own. In the Australian removable storage market, Iomega has long been the undisputed champion, with its Zip and Jaz drives clear market leaders. SyQuest was once the main rival, but the closure of its Australian branch in 1997 allowed Iomega to strengthen its hold on the market. Increased demand for more storage space has seen the range of products expand. APC looked at six types of removable storage currently available and put them through their paces.

Castlewood Orb 2.2G USB External

When the Castlewood Orb drive burst onto the scene, it was obvious that people would take notice. The drive was a breath of fresh air in an Iomega-dominated market (having risen from the ashes of SyQuest). Its use of magneto-resistive (MR) technology gave hope to those frustrated by the correlation between mega-storage and megabucks.

The most promising aspect of MR technology (first developed by IBM) is that it allows manufacturers to increase the capacity of a storage drive without sacrificing performance or increasing costs by much. This is

why the Castlewood Orb can offer 2.2G of storage for \$599 and \$99 per disk, compared to \$747 and \$210 per disk for the 2G Jaz drive.

For this review, APC looked at the External USB version of the Orb, which is a SCSI product with a USB bridge. Being USB, the device is compatible with both PCs and Macs, and comes in a translucent casing. Setup was extremely easy, and the Windows 98 test system instantly recognized the device by .

In the benchmark tests, the Orb didn't live up to expectations, particularly when compared to the 2G Jaz drive. This is because of the limitations of USB; it was particularly noticeable in the Business Disk WinMark 99, where the Orb managed a mere 653 to the Jaz's 1,320. The High-End Disk WinMark 99 also saw the Jaz outperform the Orb, with scores of 3,320 and 1,100 respectively.

However, even with its mid-range results, the Orb is outstanding value for money when you consider the price difference between the two devices. Another important consideration is that the Orb



Quick facts

Media capacity	2.2G
Cost per megabyte	5 cents
Business Disk WinMark 99	653
High-End Disk WinMark 99	1,100
Average transfer rate (MPEG file)	0.49Mbps

has always claimed to be a viable alternative to the Zip drive and, from APC's tests, we can see why. The Orb topped the Zip drive in the Business Disk WinMark 99. If you're considering a large-scale storage option, but don't want to pay through the nose, you'd be better off buying a 2.2G Orb rather than the comparatively miniscule 250M Zip, which costs only one-third less.

Contact	Business Bits
Phone	(02) 9264 0946
Online	http://www.bbts.com.au/
Price	\$599 (one disk included) 2.2G disk: \$99
In short	A good value device with large storage capabilities.

Fujitsu DynaMO 1300 SE SCSI External

The biggest selling point of the Fujitsu DynaMO removable storage drive is the durability of the media. Its magneto-optical (MO) disk technology is a popular choice for backing up PC files.

MO disks use a combination of magnetic and optical technologies to create an impressive amount of data density. The total

capacity of each DynaMO 1300SE disk is 1.3G.

The advantage over purely magnetic disks is that MO disks are virtually indestructible; they can't be destroyed by shock, vibration, moisture, dust, x-rays or magnetic fields, all of which can wreak havoc on magnetic media.

The downside is that the DynaMO is slow. Really slow. In APC's test transfer of an 89M MPEG file, the

DynaMO put in the worst performance by seven minutes. The total time taken to complete the transfer was an abysmal 11 minutes and 26 seconds.

However, the DynaMO scored well in the Business Disk WinMark 99 benchmark, which rates the device for general use. The drive placed second overall behind the Jaz drive, with a score of 860.



Quick facts

Media capacity	1.3G
Cost per megabyte	4 cents
Business Disk WinMark 99	860
High-End Disk WinMark 99	N/A
Average transfer rate (MPEG file)	0.13Mbps

Judging by the results, the DynaMO is probably best for data that you know you want to keep for a very long time in a very safe place — and if you don't mind taking a very long coffee break while waiting for the transfer to complete. Even though it's slow, the DynaMO handles data in a very secure and reliable way.

Contact	Fujitsu
Phone	(02) 9776 4555
Online	http://www.fujitsu.com.au/
Price	\$734 1.3G disk: \$55
In short	Slow, but overall performance is good.

Imation SuperDisk 120M USB External

The ambitiously titled Imation SuperDisk has the smallest capacity of all the devices tested by APC, at a mere 120M. Compared to the others, it really is small fry, but this is no reason to write off the product.

It's easy to fall into the trap of wanting the biggest and most powerful product available. What you should be asking yourself is whether you need a large-scale storage device for housing your biggest files so you can free up space on the hard drive, or just something bigger than a 1.44M floppy (which it also

reads) for file storage purposes. If the latter is the case, then the SuperDisk may be for you.

Due to its capacity limitations, the SuperDisk did not meet the minimum criteria for the ThreadMark or High-End Disk WinMark 99 tests, and returned mediocre results for the rest. In the Business Disk WinMark 99, the SuperDisk recorded the poorest result of 320. This was almost half the score of its closest rival, the Zip 250.

In APC's MPEG file transfer test, the SuperDisk took four minutes and 35 seconds to complete the transfer, which was only one minute longer than the 2.2G Castlewood Orb. The SuperDisk clocked a far more respectable one minute and 52 seconds transferring the file back to the PC.

At a cost of \$218.90 for the drive and \$31.90 for single disks, you would be hard-pressed to beat the SuperDisk, as long as you're not looking for storage space to rival the size of your hard drive.



Quick facts

Media capacity	120M
Cost per megabyte	26 cents
Business Disk WinMark 99	320
High-End Disk WinMark 99	N/A
Average transfer rate (MPEG file)	0.32Mbps

However, it's important to note that the 250M Zip streaked ahead of the SuperDisk in the tests. The Zip has double the capacity of the super floppy and could be a safer bet if you are uncertain whether 120M is enough additional storage space. Mind you, the Zip also comes at twice the price.

Contact	Imation
Phone	(02) 9479 9000
Online	http://www.imation.com/
Price	\$218.90
	120M disk: \$31.90
In short	A simple drive with a far better storage capacity than a 1.44M floppy.

Iomega Jaz 2G SCSI External

The Iomega Jaz offers 2G of storage and is guaranteed to please the space hogs. If your PC is constantly laden with sound and video files, the option of transferring them to large removable storage such as a Jaz drive is a godsend. It's the next best thing to a second hard drive, with the added bonus of portability.

In the benchmark tests, the Jaz was the clear winner, blitzing the field. In the Business Disk WinMark 99,

the Jaz was almost 500 points ahead of its nearest rival, the Fujitsu DynaMO. The Castlewood Orb, which is the product that most closely resembles the Jaz with 2.2G of storage space, scored less than half (653) its rival's total. The Jaz was also put through its paces for the High-End Disk WinMark 99, and once again trounced the Castlewood Orb, coping well with burst rates and sustained throughput.

Transferring a one-off 89M MPEG file from PC to Jaz, produced the best results of all the devices tested. The completed transfer clocked in at an impressive 58 seconds. The return transfer was an even more impressive 15 seconds, half that of its closest rival, the OnStream.

In addition to the MPEG file test, the drives were subjected to the ThreadMark test to determine average transfer rates per second, compared with the average utilisation of the PC's CPU. Many of the drives scored erratically, but

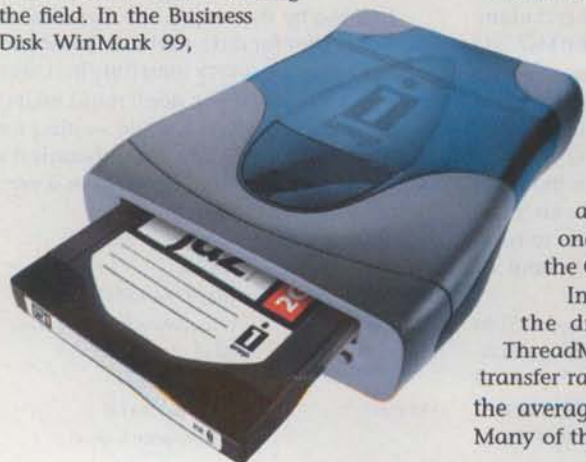
Quick facts

Media capacity	2G
Cost per megabyte	11 cents
Business Disk WinMark 99	1,320
High-End Disk WinMark 99	3,320
Average transfer rate (MPEG file)	1.53Mbps

the Jaz was one of the most consistent. The transfer rate recorded was 2.5Mbps, with average CPU utilisation of 6.45%, a result of its SCSI interface.

The Jaz drive was the fastest and most efficient of its class. Its only drawback is the price: \$747 plus media.

Contact	Iomega
Phone	(02) 9925 7700
Online	http://www.iomega.com/
Price	\$747
	2G disk: \$201 each (if bought in a pack of three)
In short	A high-volume, high-performance device.



Iomega Zip 250 USB External

Iomega is the grande dame of removable storage and the user-friendly purple Zip drive is its claim to fame. Such is the popularity of this device that the company boasts over 100 million sales. This could be because the Zip is not too far removed from the trusty 1.44M floppy we know and love; it just holds a lot more. The most recent incarnation of the Zip can take up to 250M of data via a USB connection. Installation is a snap, with an easy-to-follow online manual providing thorough instructions and troubleshooting tips.

The Zip 250 USB's nearest rival was the 120M Imation SuperDisk. In the Business Disk WinMark 99 benchmark test, the Zip 250 scored 611, which placed it second last. Given the wide range of devices tested, it was not surprising that the smaller drives occupied the lower end of the ranking list. However, the much larger Castlewood Orb only just beat it to secure fourth place.

The High-End Disk WinMark 99 was inconclusive for the Zip 250, as the device did not meet the minimum real formatted space requirements needed to run the program. Similarly, the Zip 250 was ineligible for the Thread-Mark test due to lack of storage space. Both of these benchmarks are more appropriate for testing large-scale storage systems.

The Zip USB performed well processing everyday tasks. The transfer of a standard 89M MPEG file from PC to the Zip 250 was completed in one minute and 51 seconds, which placed it third overall. The return transfer took less time at one minute and 20 seconds, earning

Quick facts

Media capacity	250M
Cost per megabyte	14 cents
Business Disk WinMark 99	611
High-End Disk WinMark 99	N/A
Average transfer rate (MPEG file)	0.80Mps

the device fourth place overall.

The Zip 250's results show why it is popular with those who need a modest amount of additional storage space. However, if you do need more space, the Castlewood Orb drive might be a more economical investment in the long term.

Contact	Iomega
Phone	(02) 9925 7700
Online	http://www.iomega.com.au/
Price	\$395 (one disk included) 250M disk: \$34.70 each (if bought in a pack of two)
In short	A good size for small-scale storage on one disk.



OnStream Echo 30G USB External

With the development of magnetic, magneto-optical and now magneto-resistive technologies, using tape cartridges for removable storage purposes is almost laughable. The necessity of spooling through the tape cartridge to reach the desired data is one of the reasons the technology has been overlooked as a viable option for uses other than for backing up large batch files (such as accounts and payroll).

If the size of the storage capacity the OnStream Echo isn't enough to make you reconsider your decision on tape storage, then nothing is. It offers an astounding 30G of storage per cartridge. Mind you, this is 30G of *compressed* storage, made possible with the use of the OnStream software that is bundled with the drive. When left uncompressed, the capacity of the drive is reduced to a still sizeable 15G.

OnStream Echo software is geared towards backing up hard drives, and does so automatically each time changes are made to existing data or when new files are

created. The backup works immediately from installation and operates in the background. The software also features a cataloguing system, which helps you keep track of files, minimising the need to spool through reams of tape in the blind hope that you might uncover them. The catalogue is stored on your hard drive and tracks all files stored, regardless of which cartridge they appear on.

Quick facts

Media capacity	30G (compressed)
Cost per megabyte	0.003 cents
Business Disk WinMark 99	N/A
High-End Disk WinMark 99	N/A
Average transfer rate (MPEG file)	0.87Mps

The benchmark tests were not a true reflection of the Echo's ability, as neither the Business Disk WinMark 99 or the High-End Disk WinMark 99 could be run on the device. Because the drive does not recognise filenames larger than eight characters, it rejected many of the files used in the benchmark tests.

Contact	Servex
Phone	(02) 8762 3500
Online	http://www.onstream.com/
Price	\$899 30G cartridge: \$99
In short	An enormous amount of storage.



Removable storage: Specifications and results

Product	lomega Zip 250 USB External	lomega Jaz 2G USB External	Fujitsu DynaMO 1300 SE SCSI External	Imation SuperDisk 120M USB External	Castlewood Orb 2.2G USB External	OnStream Echo 30G USB External
Contact	lomega	lomega	Fujitsu	Imation	Business Bits	Servex
Phone	(02) 9925 7700	(02) 9925 7700	(02) 9776 4555	(02) 9479 9000	(02) 9264 0946	(02) 8762 3500
Online	http://www.lomega.com.au/	http://www.lomega.com.au/	http://www.fujitsu.com.au/	http://www.imation.com/	http://www.bbts.com.au/	http://www.onstream.com/
Price	\$395	\$747	\$134	\$218.90	\$599	\$899
Media price (each)	\$34.70	\$201 (if bought in a pack of two)	\$55 (if bought in a pack of three)	\$31.90	\$99	\$99
Media included with purchase	Yes	No	No	No	Yes	No
Media capacity	250M	2G	1.4G	120M	2.2G	30G (compressed), 15G (uncompressed)
Interface	USB	SCSI	SCSI	USB	USB	USB
Internal/external	External	External	External	External	External	External
Time to transfer test file from PC to device (min:sec)	1:51	0:58	11:26	4:35	3:02	1:42
Time to transfer test file from device to PC (min:sec)	1:20	0:15	0:30	1:52	0:33	1:49
Business Disk WinMark 99	611	1,320	860	320	653	N/A
High-End Disk WinMark 99	N/A	3,320	N/A	N/A	1,100	N/A
ThreadMark average data transfer rate (Mps)	N/A	2.5	1.21	N/A	0.49	N/A
ThreadMark average CPU utilisation (%)	N/A	6.45	18.64	N/A	13.94	78.27

All products tested are versions available to the general public at the time of publication unless otherwise stated.

Information contained in this article is based on products and specifications supplied to APC by distributors at the time of writing. Readers should check current pricing and specifications with distributors.

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Editor's Choice

Castlewood Orb 2.2G

Highly commended lomega Jaz 2G



The Castlewood Orb's large capacity and extraordinarily low cost per megabyte earns it our Editor's Choice award. Only a slight improvement in performance would see it as a serious challenge to the lomega. The main difference between the two is the interface. The Orb trades the performance of SCSI for the convenience of USB (there is a SCSI version available).

However, there is a reason lomega sits at the top of the removable storage heap. Its drives are proven performers.

How we tested

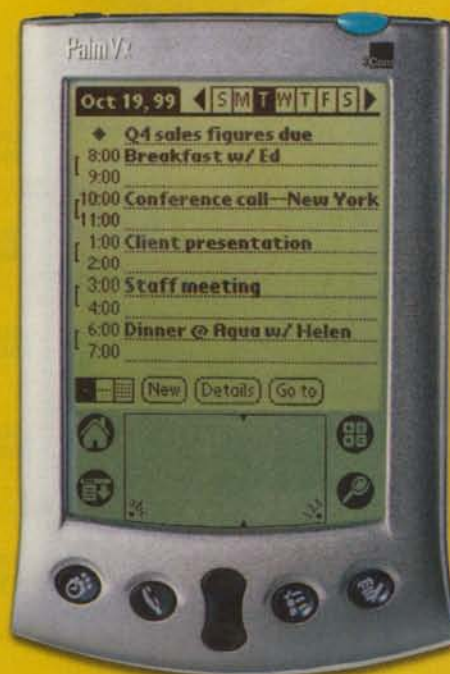
The storage devices APC Labs reviewed were initially assessed according to how easy they were to install and operate. We then subjected each drive to a series of file copy tests, using the same 89M MPEG file. We timed how long it took each device to copy the MPEG file from the PC's hard drive to the cartridge of the storage device using Windows Explorer, and then timed copying the same file back to the PC's hard drive. The devices were then assessed by Adaptec's **ThreadMark 2.0**, a 32-bit application that performs read and write operations on the hard disk using standard Win32 API commands. ThreadMark also performs an extensive set of disk drive tests to calculate the drive's data transfer rate.

Next, we ran the Ziff-Davis **Business Disk WinMark 99** and **High-End Disk**

WinMark 99 tests. The Business Disk WinMark 99 test emulates business application disk use, treating the drive as though it were a hard drive. The High-End Disk WinMark uses the reading and writing characteristics of high-end applications to test the drive's performance. The lower end drives — Imation SuperDisk, lomega Zip 250 USB — were not eligible for this test due to lack of storage space. This test is designed for those devices that can store enough information to feasibly replace or complement a hard drive.

All devices were tested on the following system: AMD Athlon 800MHz, Windows 98 Second Edition, 128M SDRAM, 20.5G DPTA-372050 hard disk drive, FAT32 file system and Sound Blaster Live soundcard.

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TOSHIBA SATELLITE 2180CDT W98 AMD K6-2 475MHz, 64MB Ram, 4GB HDD, Int. 24x CD-ROM, 12.1" TFT Display, 56K Modem, Windows 98, 1 year warranty.

PRICE EX GST: \$2385
INC GST: \$2620

TOSHIBA SATELLITE 2670DVD W98 Pentium III 450MHz, 64MB Ram, 6GB HDD, Int. 4x DVD-ROM, 12.1" TFT Display, 56K Modem, Windows 98, 1 year warranty.

PRICE EX GST: \$3180
INC GST: \$3500

TOSHIBA SATELLITE 2650XVD W98 Celeron 466MHz, 64MB Ram, 6GB HDD, Int. 4x DVD-ROM, 14.1" TFT Display, 56K Modem, Windows 98, 1 year warranty.

PRICE EX GST: \$3275
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TOSHIBA SATELLITE PRO 4270XVD NT4/W2000 Intel Celeron 500MHz, 64MB Ram, 6GB HDD, Int. 6X DVD-ROM, Int. 24X CD-ROM, 14.1" TFT display, FDD, 56K Modem, NT4 & Windows 2000.

PRICE EX GST: \$3736
INC GST: \$4110

TOSHIBA SATELLITE PRO 4270XVD W95/W98SE Intel Celeron 500MHz, 64MB Ram, 6GB HDD, Int. 6X DVD-ROM, Int. 24X CD-ROM, 14.1" TFT display, FDD, 56K Modem, Windows 95 & 98 Second Ed.

PRICE EX GST: \$3575
INC GST: \$3930

TOSHIBA SATELLITE PRO 4280XVD NT4/W2000 Intel Pentium III 500MHz, 64MB Ram, 6GB HDD, Int. 6X DVD-ROM, Int. 24X CD-ROM, 14.1" TFT display, FDD, 56K Modem, NT4 & Windows 2000.

PRICE EX GST: \$4259
INC GST: \$4685

TOSHIBA SATELLITE PRO 4280XVD W95/W98SE Intel Pentium III 500MHz, 64MB Ram, 6GB HDD, Int. 6X DVD-ROM, Int. 24X CD-ROM, 14.1" TFT display, FDD, 56K Modem, Windows 95 & 98 Second Ed.

PRICE EX GST: \$4095
INC GST: \$4500



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TOSHIBA SATELLITE PRO 4320XVD NT4/W2000 Intel Pentium III 600MHz, 64MB Ram, 12GB HDD, Int. 6X DVD-ROM, 14.1" TFT display, FDD, Int. 24X CD-ROM, NT4 & Windows 2000.

PRICE EX GST: \$4955
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TOSHIBA SATELLITE PRO 4320XVD W95/98SE Intel Pentium III 600MHz, 64MB Ram, 12GB HDD, Int. 6X DVD-ROM, 14.1" TFT display, FDD, Int. 24X CD-ROM, Windows 95 & 98 Second Ed.

PRICE EX GST: \$4789
INC GST: \$5269

TOSHIBA TECRA 8100 C500 W95/98SE Intel Celeron 500MHz, 64MB Ram, 6GB HDD, Int. 24x CD-ROM, 14.1" TFT display, 56K modem, FDD, Speakers, Windows 95/98SE.

PRICE EX GST: \$4330
INC GST: \$4765

TOSHIBA TECRA 8000/CELERON 400 Intel Celeron 400MHz CPU, 64MB Ram 6GB HDD, 24x CD-ROM, 14.1" TFT, 56K modem, Win 95/98.

PRICE EX GST: \$4500
INC GST: \$4950

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INC GST: \$2809

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INC GST: \$3109

PRESARIO 7500/C566 CEL566/64 Celeron 566MHz, 64MB, 10GB, 40x CD, 1.44MB FDD 56K ITU V.90 modem, Intel i810e graphics, ESS Allegro Sound, Windows 98 SE.

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PRESARIO 7800/P550 PIII550/64 Pentium III 550MHz 256KB cache, 64MB RAM, 15.0GB HDD, 8X DVD-ROM, 100MB ZIP drive, 1.44MB FDD, 56K modem Windows 98, Encarta, Word, Works 2000

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INC GST: \$2645

With 17" Monitor

PRICE EX GST: \$2549
INC GST: \$2800

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INC GST: \$1180

KODAK DVC325 DIGITAL VIDEO CAMERA

Digital Videoconferencing camera. 640x480 pixel res. 24-bit colour. 30 frames per second at 176x144 pixels. Manual focus. USB interface. Win95/98

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INC GST: \$260

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INC GST: \$195

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Windows and Linux: the perfect combination?

Running Windows applications has always been tricky for people running Linux. However, recent software releases have changed all that. **Ashton Mills** takes a look at how easy it is to run Windows applications under Linux, and discovers that two OSes really are better than one.

Who would have thought that the two most popular and diametrically opposed operating systems could combine to create, at least for the time being, an OS that does it all?

The strengths of Linux are its stability and efficiency, while Windows' strengths lie in its applications and ease of use. Logically, running Windows applications under Linux should be a fantastic opportunity to have the best of both worlds, without the need to reboot.

Those who've used Linux will understand why it has grown so fast in popu-

larity. It's more stable and efficient than Windows, it was developed under the open source model, and it's free. However, an OS is only as useful as the things you can do with it.

This has always been the Achilles heel of Linux. However, the past year has seen vast improvements in interface design and ease of use, greatly reducing the learning curve for users. Current distributions are easier and quicker to install than Windows. They'll even allow you to install and launch Linux from *within* Windows.

None of this means much if you're a Microsoft Word fan. No amount of talking will get you to move to a Linux native word processor. This is true for just about every APC journalist.

It's not surprising that for some time there have been a number of Linux projects with a simple, unified, goal: to grant Linux the ability to run Windows applications. And do they work? Yes, indeed. If the only reason you haven't switched to Linux yet is because you need to run a few vital Windows applications, your wait is over.

The players

This time last year, we wouldn't have said that it was easy, or even practical, to run Windows applications under Linux. But things have changed, and the three products reviewed here all succeed (for the most part) in making this a reality. Each program approaches the goal in a different way, and as a result each has its own benefits and limitations. However, all of them allow you to run Windows as just another application on your Linux desktop. Best of all, when Windows eventually crashes, it won't bring down your system. Rebooting Windows has never been so fast.

VMware 2.0

VMware has been around for over a year and was the first reliable solution for running Windows under Linux. Technically, it's not designed to run just Windows, but to run *any* OS under both Linux and Windows (VMware for Windows is available). It's most commonly used to run Windows under Linux.

VMware is an x86 machine emulator. It creates an entire virtual PC contained within its own space on your desktop. It has a BIOS and detectable hardware features, and will run DOS, all versions of Windows and some versions of Unix (including Linux).

This also makes it attractive to developers for this reason. Almost any operating system can be installed into the VMware virtual machine, and because it emulates all the resources an operating system expects to



Running Windows 98 on the Linux desktop

find, it can be used to test multiplatform applications on one PC. For technical support personnel, for example, being able to walk through a variety of operating systems on the one machine is a real advantage.

VMware works flawlessly with Windows. For all intents and purposes, Windows 'thinks' it has been installed on a PC, and not in a virtual machine. As a result, it runs Windows and all the applications you are familiar with, on your Linux desktop.

However, there's a trade-off (isn't there always?). Emulating an entire machine as VMware does is costly, both in memory and CPU time. If you create a 64M virtual machine, that's 64M less for Linux to work with. And the CPU time involved in running a virtual machine with Windows inside it is quite a hit. There's no other way to say it: VMware is slow.

To help get around this, an optimised X server is provided to run VMware full screen. It goes some way towards improving graphics speed, and this helps responsiveness, but it's still nowhere near as fast as running Windows alone on the same machine.

When APC first tested VMware last year (see APC July 1999, page 38), we were certainly impressed. It was quite an achievement to run Windows fully on the Linux desktop, but it wasn't fast enough. It was usable, but it wasn't enough to make us abandon our Windows partitions.

However, the fact that it emulates an entire PC so well does have its benefits. Networking is fully implemented, not only at the TCP/IP level as with Win4Lin and Wine (reviewed on the following pages), but also at the OS level with Windows networking. The integration with Linux is seamless, allowing a Windows virtual machine to act as a separate machine on the network with its own address and resources. Direct access to physical ports for modems, printers, CD-ROMs and floppy disks is also enabled between Windows and Linux by VMware.

Installation is simple. An install script

automates the process and modifies the system's boot process to launch the required VMware modules. If your kernel is a recent and unsupported version, the script automatically compiles from source the modules to match your kernel and installs them.

VMware is guaranteed to allow you to run Windows under Linux the same way you would use it as a standalone system, but it's not fast, even on a high-end machine. Unless you expect to be running some obscure software that might require a strictly realistic environment, it might not be the best tool for the job. If you only need to run standard Windows programs, and run them fast, take a look at Win4Lin.

Win4Lin 1.0

Win4Lin has only recently appeared on the scene. It is what many Linux users have been waiting for for so long. Like VMware, Win4Lin runs a copy of Windows under Linux, but it's fast. It's not just 'acceptably' fast, as you might expect for an emulator running on top of Linux. It runs at almost full speed, just as if you were running Windows alone.

Until you see it running, you can't appreciate what a difference this makes. Windows installs faster under Win4Lin than it does on a bare system, due to the increased speed that using Linux and its file system provides. Win4Lin writes files directly to the Linux file system; it doesn't use a virtual disk container like VMware.

And the trade-offs? There are quite a few, but if you only plan to use Windows for common applications, you won't find

Summary

Guaranteed to run all Windows programs perfectly, albeit rather slowly. Able to install any version of Windows, and even Linux, into the virtual machine. Full networking support, good sound and partial DirectX support. A stable, fully contained environment.

Contact	VMware
Phone	N/A
Online	http://www.vmware.com/
Price	\$US99 for students/home users, \$US299 for others
Requires	Pentium II 300 (SMP supported), 96M RAM, Linux kernel 2.0.32

Summary

Fast. Able to run just about all Windows programs perfectly, but can't be used with NT or Windows 2000. TCP/IP networking support, but can't directly use Windows networking. No sound and DirectX support yet. Easy file sharing between Windows and Linux. Not demanding on system resources.

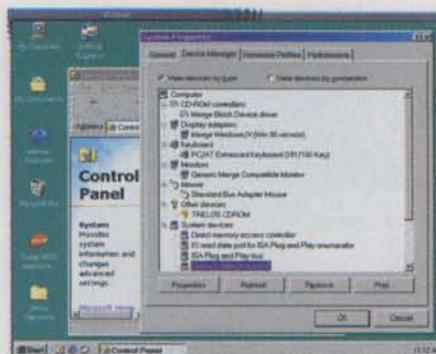
Contact	EverythingLinux
Phone	(02) 9712 1799
Online	http://www.win4lin.com/
Price	\$90
Requires	Pentium 200 (SMP not supported), 64M RAM, Linux kernel 2.2.x

much lacking. The Win4Lin's limitations different to VMware's because of the way Win4Lin was designed. VMware aims to emulate an entire PC and provide full compatibility, while Win4Lin emulates just enough of an environment to run DOS and its Windows front end.

For now, Win4Lin doesn't support DirectX and sound (whereas VMware and Wine do, in part) and, more importantly, it doesn't support Windows networking. TCP/IP is there in all its glory, so Net surfing and any TCP/IP-based applications work fine, but you can't, for instance, use Windows networking to browse machines and share files on a Windows network. Linux can do this using Samba, so it's possible to mount network shares onto Linux and let Win4Lin access resources this way, but it's a hassle compared to native Windows networking. All of these features are planned for a future release.

Win4Lin4 is unable to run NT or Windows 2000. This won't change because, unlike other Windows versions, NT and Windows 2000 don't operate from a DOS environment that is easy to emulate.

There are many advantages to Win4Lin's design. Because Windows is installed onto the Linux file system and not onto a virtual disk, file access is lightning fast. Easy file sharing between Windows and Linux is also possible, because Windows is just another directory on the file system. This design also allows you to share any device that exists on the file system. You can mount a Samba share over the network and connect the directory under Win4Lin as a drive. If Linux can see



Windows 98 running under Win4Lin

and use it, so can Windows (as long as it's a resource Windows is capable of using). Direct access to COM and LPT ports is also available, as well as the ability to create drive mappings to any other partitions on your system.

Win4Lin isn't as taxing on your RAM and CPU as VMware. You still have to allocate a set amount of RAM for Windows to use, and this takes RAM away from Linux, but Win4Lin's overhead is minimal.

Win4Lin requires a modified kernel which you can patch yourself using the instructions provided. Alternatively, you can install a pre-modified kernel from the installation CD. Kernels are provided for all popular distributions. This aspect of installation isn't as slick as VMware. You'll need to recompile your kernel if you use the kernel patch, whereas VMware uses modules and doesn't touch your kernel.

Once installed, Win4Lin copies all the Windows setup files from your CD to the hard drive and uses some of them to create a real DOS environment in which Win-

dows can then be installed. The whole process is automatic. When you want to install Windows itself, Win4Lin does so from the hard drive and performs a scripted Windows install. The only time you have to interact is to type in your serial number for the Windows CD.

This automatic installation allows Win4Lin to ensure that Windows is installed in a way that is compatible with the environment it has created. For example, Windows networking isn't installed, only TCP/IP support. This is something to remember if Windows components are added later; doing so might destroy the tailored environment Win4Lin has created.

Not all Windows programs will work flawlessly, especially networking ones (at least for the moment). Because Win4Lin emulates just what it needs to, some special Linux-compatible files replace key Windows system files. This allows seamless integration, but might cause a problem if a program wants to use these files in the conventional Windows sense. It's easy to see which key files have been modified by looking at your installed Windows structure on the Linux file system. Symbolic links point to the new files. Most of these deal with networking, so unless you intend to run networking tools (and not just programs that want to use TCP/IP), you shouldn't run into any problems.

Win4Lin is the first product that allows you to use Windows under Linux the same way you would use Windows on its own. And it can't be stressed enough: Win4Lin is fast.

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Wine

Wine, or Wine Is Not an Emulator, has been in development as an open source project since 1993. It started as a method to support running Windows 3.1 programs under Linux. Today it has the ability to run 32-bit Windows programs. You don't need the Windows OS to use Wine; all you need are the applications.

The most important difference between Wine and VMware or Win4Lin is that Wine doesn't emulate a PC to install Windows in. Instead, it replaces the APIs that Windows applications expect to find. Wine is not so much an emulator as a 'Windows compatibility layer', providing a mechanism for Windows applications to operate natively on your Linux desktop.

Microsoft isn't the type of company to release details about how its OS works, so it has taken the Wine team many years of reverse engineering to faithfully re-



Running WordPad under Linux using Wine

create, all in original code, the APIs that Windows programs need, right down to the bugs that cause Windows users so much hassle. If the Wine developers fix the bugs, it will break those Windows applications that expect the APIs to operate in a certain way. And so the bugs stay.

Unlike Win4Lin, Wine includes sound and partial DirectX support. Wine has been known to run certain games, but you have a better chance of older games working successfully than the latest releases. TCP/IP networking is also supported, but not Windows networking. The purpose of Wine is to run a Windows application right on your desktop. Any external resources needed by the program — disk access, networking and so on — are already present with Linux. The Windows application acts just like it is a Linux application.

Like Win4Lin, Wine is fast, but it can be unstable. For example, you can't run the latest version of Internet Explorer (not that you'd need to) because, although the application itself is an individual program, it happens to be tightly integrated into Windows, and some of the resources it requests don't exist.

Other programs, such as earlier versions of Microsoft Word, work fine. It's really a matter of trial and error to see which programs will or won't work. The Wine home page contains a searchable database of applications known to work. The home page is also a great resource for any information relating to running Windows under Linux, so be sure to check it out.

Wine is constantly being developed, so what doesn't run smoothly under Wine now might end up working further down the track. If you're running Linux, you probably already have it installed. Most distributions either bundle Wine with the distribution CDs or install it automatically. You don't need a version of Win-

dows to use Wine, but if you do have a Windows installation on your machine, Wine can optionally take advantage of the Windows APIs installed, supplementing its own.

Wine is a remarkable program. To reverse engineer a closed operating system, re-create the APIs its programs expect to find, and have it work as well as it does is quite an achievement. Even if you decide to use a commercial solution such as VMware or Win4Lin, you should take a look at Wine.

Summary

Doesn't require the presence of Windows. It will run some Windows applications natively on the Linux desktop, but not all; finding out if your favourite program works is a matter of trial and error.

TCP/IP networking, sound and some DirectX support. Free, and often installed with Linux distributions.

Contact	N/A
Phone	N/A
Online	http://www.winehq.com/
Price	Free
Requires	486, 32M RAM

What about games?

We all know the truth: Windows applications are boring; games are what's important. So how well do games run under these tools? Not too well, actually. Understandably, they weren't designed with games in mind, but it's not impossible.

Wine is the most likely contender for running Windows games under Linux, followed by VMware. Of course, it would be far better to run a game natively under Linux. If you've been following gaming news, you'll know that there are quite a few big-name games that run under both Windows and Linux.

First person games require the use of beefy 3D hardware which, in the past, has been a sticking point for Linux because of the way the X Window System works.

If you have a 3dfx card, you already have full driver support and you can play games such as Linux Quake and Unreal Tournament as fast as you can under Windows. For those who don't use 3dfx cards, the upcoming release (4) of the X Window System includes a new system for directly accessing 3D hardware.

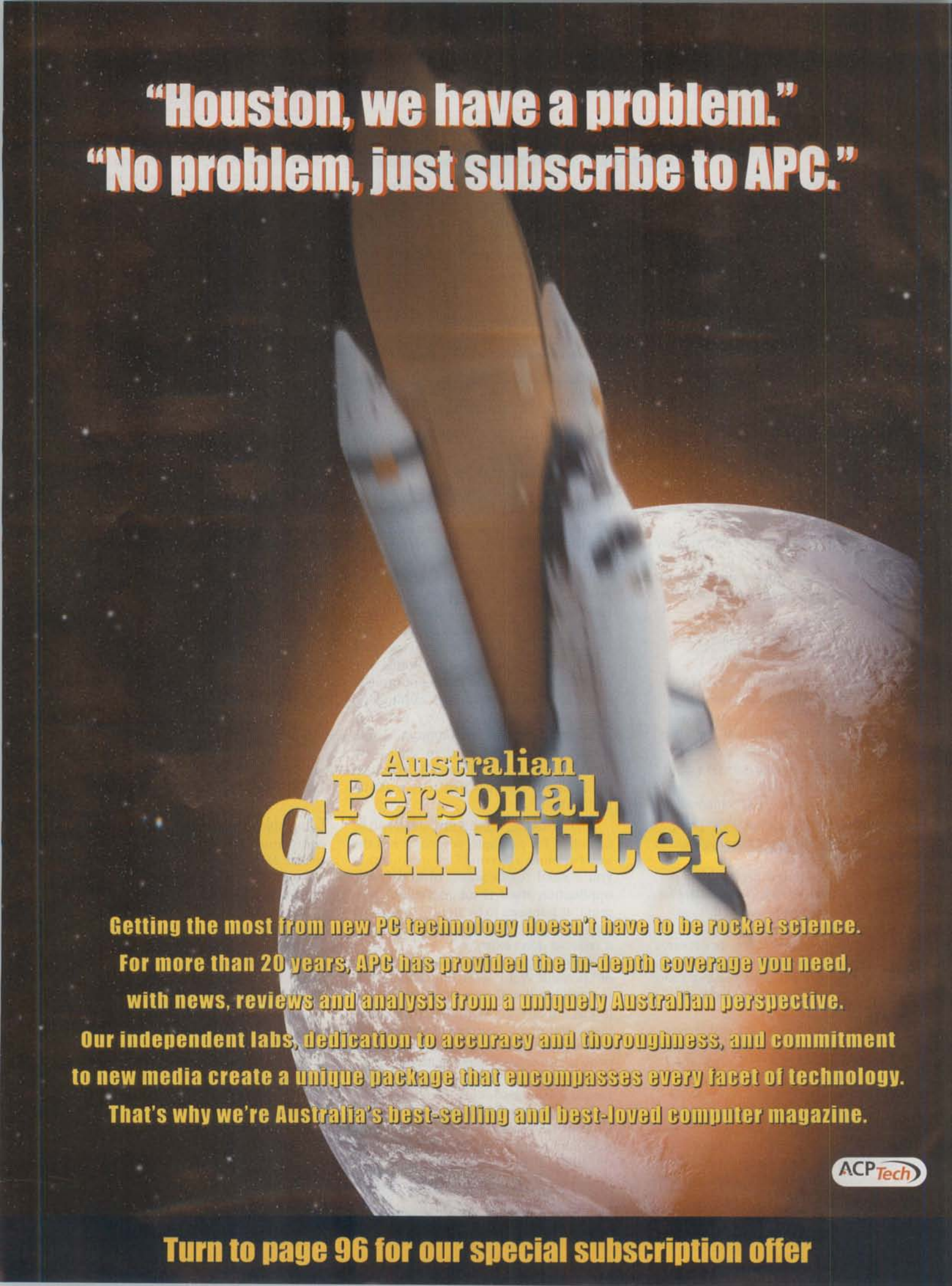
For the latest developments in Linux games, check out <http://www.linuxgames.com/>.

Conclusions

Being able to run Windows efficiently and easily under Linux is an interesting experience. And it's an important step if Windows users are going to try a migration to the penguin operating system.

Given that both VMware and Win4Lin require the presence of a Windows CD, you still have to pay for the privilege of running Windows under Linux. A good question to ask yourself is whether it's easier to run Windows under Linux using the above programs, or to create a dual-boot system. If system resources are important, as they are with games, it's probably better to run Windows alone on a dual-boot configuration. If running Windows side by side with Linux is an advantage, you can now do this too.

It's great to be able to finally create a pure Linux system and not miss out on the few critical Windows applications you know and love (or in the case of work, need). Perhaps it's only a matter of time before Windows becomes nothing more than an image on the Linux desktop. ■



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OS/2 finds a new home

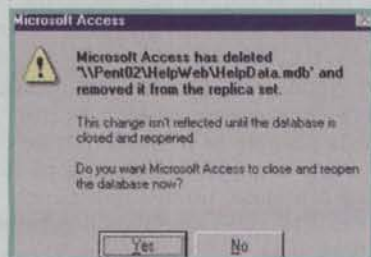
A few concerned readers have asked why APC has forsaken OS/2. The short answer is that we haven't. The OS/2 column has moved to the Workshop section of the cover CD. When choosing what to include in the pages of Workshop, APC often walks a tight rope, balancing the needs of all readers in a relatively finite strip of print real estate.

When the column was moved, we knew that OS/2 users would be shaking the rope, reminding us of APC's commitment to alternative operating systems. How can we honour this commitment without making room to cover new operating systems, and other topics of interest to our readers? Neither IBM, nor the software development community as a whole, provides anywhere near the kind of support for OS/2 that they have in the past, so it was the obvious candidate for review. Moving the OS/2 column to the CD seemed like a happy compromise. You'll find it on the CD for a long time to come.

Andrew Colley, Workshop coordinator

Bug of the month

This month's bug finder, Brendan Boyle, displayed questionable judgement by dedicating many months of his life to the development of an Access database. After some problems opening his work via a network, Brendan was less than ecstatic to see the following message.



After the echoes of his screams had died down and Brendan had been revived with smelling salts he discovered that the software had lied, and simply dropped the network connection, rather than erasing his work. It's odd to find

Workshop is a reader-input section. Send ideas, comments or criticisms to workshop@acptech.net, or to our snail mail address APC Workshop, PO Box 4088, Sydney NSW 1028. Alternatively, join one of the online discussion forums at apcmag.com to raise technical issues with fellow DIY enthusiasts or voice your opinion on any Workshop topic.

Updates on Mac OS

In a column about adding a USB interface to an older Power Macintosh (APC June 1999, page 158), we mentioned that the Hewlett-Packard ScanJet 5200C requires a third-party driver for use with Mac OS. That's still the case, but ScanJet 5300C owners might be interested to know that a CD-ROM containing the necessary drivers plus Adobe PhotoDeluxe and Readiris OCR software is available by phoning 13 23 47, even though Macintosh software is not included with that model in Australia.

The first instalment of our recent two-part introduction to Basic on the Mac (APC May 2000, page 148) gave an incorrect URL for Chipmunk Basic. The correct URL is <http://www.nicholson.com/rhn/basic/>.

someone pleased that their software didn't behave as it claimed.

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acptech.net or snail mail to APC bug of the month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a one-year subscription to APC. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

The winner's name, along with details of the bug, will appear in this column in APC September. So start hunting!

Michael Smith

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Technobabble begins its series on storage with the simplest of all forms of storage — the floppy disk. By Alex Kidman

Technobabble

You might have a DVD drive. You possibly have multiple hard drives. There's a chance you have a Jaz drive. But it's pretty darn certain you have a floppy drive, regardless of whether you use it much. iMacs don't have a floppy drive, but their users don't seem to miss it. The increased availability of high-capacity storage devices, from Orb drives to rewritable CD-ROM drives, has meant that the humble floppy is now considered ancient technology, even though it's still a remarkable unit and nearly everyone uses it at some point.

Floppy use is declining, but they are still the best option for some tasks. Because very basic DOS (or, for that matter, Linux) can be installed on floppies, they're perfect for booting to a simple operating system. Similarly, most antivirus software comes with a boot floppy. Floppy disks aren't considered a reliable storage medium, but they're dirt cheap, and ideal if you often have to move small files such as text files.

From 8in to 3.5in

If you've ever wondered why those little **solid plastic shells sitting on your desk** are referred to as 'floppy' disks, you only need to look at the first two generations of the technology. The first generation of floppy disks were actually floppy. They were eight-inches wide, and encased in a thin mylar shell. They were very low powered by today's standards, with a wimpy 160Kbits of storage space. As they predate the PC era, your chance of encountering an 8in drive these days is very slim. If you do, APC suggests that you use it to prop up chair legs.

The older disk format you're more likely to come across is the 5.25in disk. These disks were the technology of choice up until about 10 years ago. They were still floppy, but came in larger capacities.

The most recent stage in standard floppy disk evolution (we'll get to the LS-120 Superdisk later) is the 3.5in floppy disk. These had significant design advantages over their predecessors, particularly their improved size to storage capacity ratio. The table (page 119) shows the dif-

ference in size and capacity between 5.25 and 3.5in floppy disks.

Although standard floppy drive technology is being used less, it's still useful to understand disk density. Floppy disks can be double density (DD), high density (HD) or extra-high density (ED), so picking which format stores more data (and which is the correct format for your drive) can be difficult. In order to explain the odd terminology used to describe density in this context, it's necessary to explain exactly how floppy disks work.

Tracks, sectors and platters

In much the same way as memory stores bits by using electrical impulses, a floppy disk stores data onto its surface using magnetic coding (see Technobabble, APC June, page 118 and APC July, page 118 for more information).

Inside a floppy disk's shell is a circular disk of a polyester substrate. The substrate is coated with a magnetic oxide compound on both sides. Just like standard magnetic tape, the magnetic fields generated by the oxide compound can be manipulated by the drive head to allow information to be recorded on the disk. The compound can be spread onto the disk at a variety of density levels. The higher the density of particles on the disk, the higher its storage capacity.

You might be confused by the way larger capacity disks are referred to as *high density* and smaller ones as *double density* in the table. This is simply old terminology; the double-density 5.25in disk's coating has twice the density of magnetic particles, and it can deliver twice the capacity of the coating, of a standard density in that format.

The term 'double density' became more confusing when it was applied to newer disk formats. Although its name suggests otherwise, a double-density 3.5in disk is not the largest capacity floppy in the format;

rather, its coating is twice as dense as that of a double-density 5.25in disk. It's actually the lowest capacity floppy of the 3.5in formats available.

As can be seen from the table, density can also be expressed in terms of the number of tracks per inch (TPI) or bits per inch (BPI). On 3.5in floppy disks, the standard has long been to have 315 tracks per inch of disk. For the higher density disks, it's a matter of getting more bits into the same amount of physical space.

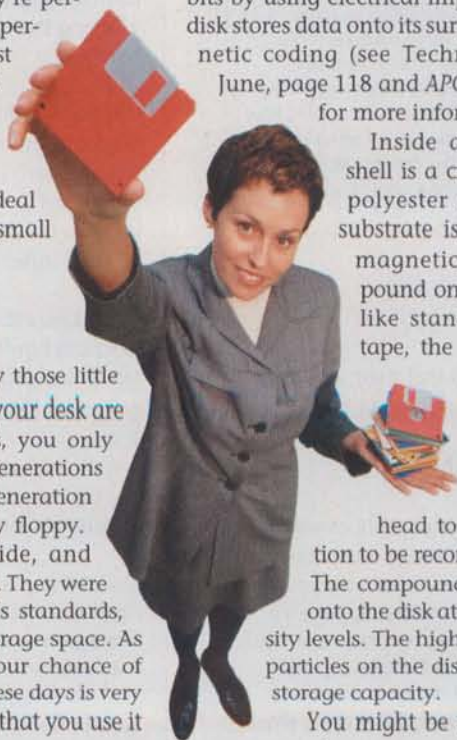
The other important difference between double and high-density disks is that high-density disks use both sides of the disk for recording, while a double-density disk normally uses a single side. For 5.25in floppy disks, this involves flipping the disk to access the other side, while 3.5in disk drives have heads that can read both sides without flipping.

Both double and high-density disks are coated on each side during construction. The difference between the two lies in the physical construction and testing of the disk. A high-density, double-sided disk is factory tested to ensure the viability of both sides, but a double-density disk only has one side tested.

The difference in physical construction is found in the use of write-protection holes. **The drive shines a light on a specific region** to determine if a disk can be written to. If the light reflects back, the hole is closed and data can be written to the disk. For both 5.25 and 3.5in floppy disks, the primary hole is on the top right-hand side (with the disk slide jacket facing outward and to the bottom). A second hole on the left determines density. If it's filled, (ie. there's no hole), the drive reports it as a double-density disk. If there's a hole present, it's high density.

It is possible to make double-density disks into high-density disks, especially with 5.25in disks, using a hole punch. Of course, these disks aren't quality checked on both sides, so results vary. Theoretically, the same can be done with 3.5in disks, but their solid plastic covers make it too much effort for little gain, since floppy disks are so cheap.

Like hard disks, floppy disks are arranged by track and sector. A reading head within the drive moves from sector to sector and track to track. It's not exactly true random access, and there are notice-



Floppy disks at a glance

Disk type	5.25in	5.25in	3.5in	3.5in	3.5in
Formatted capacity	360K	1.2M	720K	1.44M	2.88M
Track density (TPI)	48	96	135	135	135
Bit density (BPI)	5,876	9,869	8,717	17,434	34,868
Density name	Double density (DD)	High density (HD)	Double density (DD)	High density (HD)	Extra-high density (ED)

able read times because of this. The exact specification of those tracks and sectors depends on the operating system used. Macs and PCs write to a disk differently, and with different storage capacity results.

The generation gap

Although the 3.5in floppy appeared in 1980, 5.25in disks were the media of choice for PCs up until about 1990. What happened in the 10 years in between? Well, like many worthy technologies, the 3.5in was passed over in favour of the dominant standard, in this case the 5.25in floppy disk. It wasn't until Apple chose the 3.5in as the standard format for its emerging Macintosh line that IBM PC manufacturers began to consider them a serious option. As the need for larger storage capacity became more urgent, the move to the 3.5in format for IBM PCs was only a matter of time.

Other floppy formats have attempted to up the ante, with varying levels of success. Toshiba launched a 2.88M floppy in 1988, but there were several problems with the format, namely data transfer. Most motherboards have floppy controllers, and modern floppy controllers can transfer data at up to 1 megabyte per second (Mps); enough to meet the demands of just about any floppy format. However, at the time, most floppy controllers were working at just half that: 500 kilobytes per second (Kps) — not fast enough for a 2.88M floppy. Add to that high media and drive costs, and the 2.88M floppy was stillborn.

Microsoft's proprietary extended floppy format, the Digital Media Format (DMF), was more successful. It delivered 1,720Kbits per disk as opposed to the normal 1,440. DMF was used primarily as an antipiracy tool. The logic was that if people couldn't format at 1.7K (and they couldn't at the time) then they couldn't pirate the software. DMF's extra capacity comes from squeezing an extra three tracks per sector onto each floppy. DMF disks work rather like zipped files. In a DMF software package, there would be 20 (or so) DMF floppy disks, and one regular floppy with unpacking instructions for the DMF ones. Of course, if you had software on 20 or so floppy disks, floppy number 17 was always faulty. Every time.

Floppy drives

The humble floppy drive is just about the cheapest single component in your PC. Although there have been very few changes in floppy drive construction over the years, there are a few peculiarities to look out for. The 5.25in drive is a rarity now, and it would be silly to spare a drive bay for it. After you install something other than a CD-ROM drive into the 5.25in bay of most PC cases (a CD-R drive, DVD drive or tape drive), there's no space for one. Also on the endangered technology list are combination 5.25/3.5in drives, which were an attempt to bridge the generation gap between the two formats.

Floppy interfaces and cables

The basic floppy interface is straightforward. Virtually any motherboard has an onboard floppy controller with a transfer rate of 1Mps. Some machines may still have a separate I/O (input/output) card containing the floppy controller, but even then, it's just plug and forget. However, the humble floppy cable is a different matter. Floppy cables look much like any other internal PC cable — flat, grey, never quite long enough — but with a twist. Literally. Floppy cables have a twist in the middle of the cable, typically just after one of the two connectors. The twist is a time and money-saving operation.

Most BIOSes work on the assumption that you have no more than two floppy drives (and even two is rare now), assigned as A: and B: drives. If you've ever had to install hard drives, you'll be familiar with the idea of jumpering. Jumpers are pin connectors on the rear of devices that determine how the devices (in our case, a floppy drive) identify themselves to the BIOS. If you place jumper covers over the pins in one arrangement (these are normally detailed on the devices), the drive is a primary master drive. If you place them a different way, it's a slave drive.

This is necessary for hard drives, where users lash on as many as their motherboards can support, but there are never going to be more than two floppy drives connected to a floppy controller. It's a waste

of time and money to manufacture configurable drives. A far simpler solution is to allow all floppy drives to be configured according to their position on the floppy cable, a process known as *cable selection*. Many hard drives support cable selection, but it's rarely used. Floppy drives come configured to think of themselves as B: drives, and if you plug in the first connector (the one before the twist), that's what the BIOS will be told. Post twist, and the reporting signals are inverted. Instead of saying 'Listen to the B: drive, ignore the A: drive', the signal becomes 'Listen to the A: drive, ignore the B: drive'. Some BIOS software assumes you'll never have a B: drive, but you'll only pick this if you try to connect a second drive.

The other major category of devices that can use the floppy controller are tape drives. As a backup medium, tape has been hard hit by the introduction of some faster media (most notably CD-R), but in terms of pure storage capacity and per-megabyte cost, tape is hard to beat. The 1Mps restriction of the floppy interface isn't a problem for floppy-based tape drives (such as Travan drives), which are sequential access drives and can only run at the speed of the tape.

Floppy reliability

One thing that floppy disks get a bad rap for is reliability. Nearly everyone who's used a floppy for storing a vital document will have sworn at the little piece of plastic when it's gone bad. It comes down to care. If you took out your hard drive, dropped it on the floor a couple of times, then shoved it into a bag with a walkman, pretty soon you'd have a nice friendly doorstop. The same applies to floppy disks. For the amount of abuse they get (stacked next to magnetic sources, dumped at the bottom of desk drawers under masses of documents, used as emergency coasters), and the amount of protection they have against the elements (virtually none), they're quite a reliable storage medium. Next month, Technobabble takes a look at CD-ROM.

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An introductory guide to clustering.

By Nathan Taylor

Core

Clustering means different things to different people. For some, it refers to any kind of fault-tolerance system involving two or more systems. For others, it refers specifically to the use of multiple systems to parallelise execution and increase performance. It really depends on what the target market is — and what the marketing goons think will suit it best.

For our purposes, a cluster is a group of systems (individually known as *nodes*) that share some service or responsibility. They operate so that users never know which particular node they are accessing. For all intents and purposes, they appear as one device.

Advantages

There are many potential advantages of clustering. It makes a lot of sense to use it, even though it can be expensive. Apart from the fact that you need multiple servers, software for clustering is generally expensive.

The main advantages of the technology fall into three areas: availability, performance and management. The first of these applies because servers in a cluster work as backups to any others that go down. If one of the servers dies, the others dynamically take up the slack. On more advanced clusters, this takeover can happen in milliseconds.

The performance advantage of clusters stems from an ability to load balance across multiple systems. The servers can be set up to operate in parallel, giving a near-linear increase in performance capacity.

Finally, clusters can enable simple multiserver management. To a manager, a cluster can work as a single system.

Cluster forms

Clustering takes many forms, and can scale from two computers. The fundamental principle is the same for all cluster sizes, but each computer in the cluster should be able to take up the duties of other computers in the cluster should they fail.

The simplest clusters are fail-overs. Redundant systems are available should the main server fail. Clusters that are more

complex use load-balancing systems to divide work among available nodes. If one of the servers fails, the load is redistributed across the remaining systems.

Application level versus load clustering

It is possible to keep a purely redundant server, but it generally doesn't make a lot of sense. It leaves you with an entire server that sits idle in case something happens to the primary server. A more sensible application is to split the workload between the servers.

One solution is to have multiple servers that are perfectly mirrored, and an agent that splits the queries between them. The agent can be a piece of software on the servers that communicates load, or it can be a router capable of determining the load on an attached server and dividing queries accordingly. There are problems with mirrored servers; file synchronisation (see 'Storage' below) is one of them. If the data on the second server is not identical, then there might be communication problems and data errors. The client will receive different results depending on which server the load-balancing agent sends it to.

Web serving is the ideal role for mirrored, load-balanced servers. In most cases, updates are infrequent and the penalties for synchronisation lags are low. It's also very easy to add extra servers to the cluster if the average load exceeds reasonable limits.

The alternative strategy is to divvy up tasks based on application (or application components). For instance, most enterprises have more than one server application. A business might have email services, file and print services, Web services, database services and so on. Rather than having every server do everything, it often makes more sense to have some servers dedicated to specific tasks, and leave the others capable of a takeover if necessary. This obviates the problem of data synchronisation, unless one of the servers goes down.

Take an organisation with Web, email and database server needs, and two servers. It might be easiest to devote one node to Web and email, and the other to database serving. In this case, it would be a good idea to also cluster the two servers,

so that the first has the *capability* to do database serving and the second can do Web and email. If one of the servers fails, the other can kick off the additional services. Its load is effectively twice as high, but at least there's still a server (although it may be a slow one). On the downside, there might be a gulf between the information stored on one server and the other. The database, for instance, is only as current as the most recent replication.

Application-level clustering is used most frequently for smaller networks in which small groups of servers are used. It is usually far simpler to set up than a highly synchronised mirrored system. Some mirroring is still required, but this can be performed with inexpensive software solutions. A complex cluster can integrate both mirroring and application-level redundancy.

The takeover

How does one server know when another goes down? The most common means is by using what is called a *heartbeat*: a regular ping-like network packet that constantly checks to see if a server is still active. If the server is still active, it will respond to the heartbeat packet. If it is dead, it won't.

It is possible for an application to crash while the server is still active. This is more complicated, as the heartbeat has to also check the port or application layer of the desired service to see if it is still active. This often means that the server application has to also support clustering for the solution to be effective.

When a server's heartbeat stops, the other systems in the cluster have to initiate a takeover. Often this means reworking the namespace so that queries destined for the dead server are routed to a working device. Say you have two servers: server A has IP address 1, server B has IP address 2. If server A fails, then server B has to rework its IP layer so it has two IP addresses, 1 and 2. It would appear to users as *both* server A and B.

Storage

The key component of most clusters is the storage system used. When one server

fails, another might take over its job, but will it have the most recent data available to it?

There are two ways that the cluster can be set up. These are known as *shared disk* and *shared nothing*. In a shared disk situation, there is one storage set for all the nodes in the cluster. For instance, there may be one disk array to which all the servers are attached. As there is only one source, there will be no synchronisation conflicts. However, there are two main problems with this solution. First, it introduces a single point of failure; if the storage point goes down, so does the cluster. Second, some storage access arbitration is required so that servers reading and writing to the array don't cause conflicts. Such arbiters are often known as distributed lock managers.

Incidentally, the concept of the storage area network (SAN) goes hand-in-hand with shared disk clusters. SANs provide highly reliable arbitrated storage systems on their own subnetwork (see APC December 1999, page 140 for more about SANs).

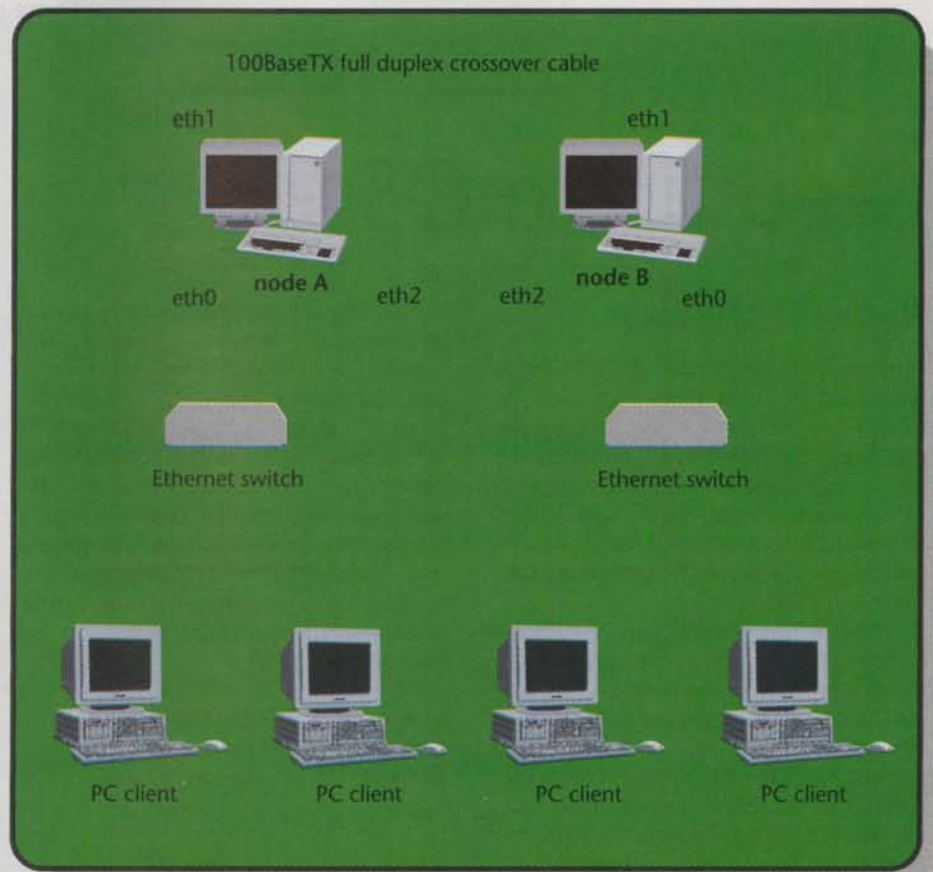
Shared nothing clusters leave individual storage systems in the hands of the nodes. Each node has its own storage, and any data changes are mirrored across all devices. Unlike shared disks, there's no need for arbitration because each node accesses its own storage subsystem. It also provides automated backup systems, with as many copies of each data object as there are nodes in the cluster.

The first and most obvious disadvantage of the shared nothing system is that it requires massive redundancy. Storage is cheap, but it's not *that* cheap. The other problem is the lag between a change to a server and its replication across the cluster. Some sophisticated mirroring techniques are available, but even so, a few milliseconds on a cluster that executes thousands of transactions per second could make a big difference.

Clustering software and hardware

With some simple scripting, it's technically possible to set up a cluster using cheap hardware and basic operating system software. It's not too difficult to set up a cheap cluster using Linux, for instance, plus a few scripts for sync-ing storage and checking heartbeat. However, if you're looking for enterprise-level clustering, it's going to cost.

Most commercial versions of Unix support clustering at some level, but these



A simple two-server cluster

operating systems are typically tied to a specific hardware platform and are purchased as part of a 'solution' from an enterprise vendor like Sun or Hewlett-Packard.

Microsoft and Novell also support clustering with their server OSes. Microsoft Windows NT 4.0 Enterprise Server and Windows 2000 Advanced and Data Center Servers both support advanced clustering.

On a hardware front, vendors like Alteon and Cisco can deliver products for router-based load division.

An example two-server cluster

The diagram above is an example of how a simple two-server cluster could be set up. Each node has three network cards: one to each of the subnetwork's two hubs, and one with a crossover Ethernet cable directly to the other server.

As there is no shared storage, this setup is an example of a shared nothing system. Each server has to replicate the contents of the other server. This is the reason for the direct link between the two of them. The frequency of that replication is a trade-off between performance and the need for

high synchronicity. The direct link also serves as the heartbeat lifeline.

The reason for the two switches is simple redundancy; if one of them fails, the other can take over. It's not technically necessary; you could take away one switch and still have the system function just as effectively.

If node B fails, the tertiary network card (eth2) in node A should be configured to take upon to the IP address and MAC (Ethernet) address of node B. The switches should rapidly update their routing tables to suit. The inverse applies if node A fails. In either case, to the rest of the world nothing happened — the servers are still up and running.

Of course, more complex systems exist. Yahoo, for instance, uses a huge server farm linked to a router with specific load-balancing functions. Each server has a special network card in it, designed to communicate load directly to the router, which then manages page request division. Ultimately, need will define the system's cluster setup and degree of complexity.

Next month, Core looks at quality of service.

Nathan Taylor can be contacted at ntaylor@acptech.net.

Step up to OS 9

These reference books will tell you everything you need to know about Mac OS 9.

The Mac OS 9 Guide

Readers could be excused for wondering how Brad Miser manages to roll out so many books while holding down a day job and being the father of a young family. His recent titles include *The Complete Idiot's Guide to the iBook*, which APC reviewed a couple of months ago (see APC June, page 126) and *The Complete Idiot's Guide to the iMac*.

The Mac OS 9 Guide is more comprehensive than its title suggests. Even though application software is not covered, this could be the only Macintosh book many people will need. We'd even recommend it to beginners who don't fear computers. Material relevant to desktop and mobile Macs is included, and there's more on hardware than we expected.

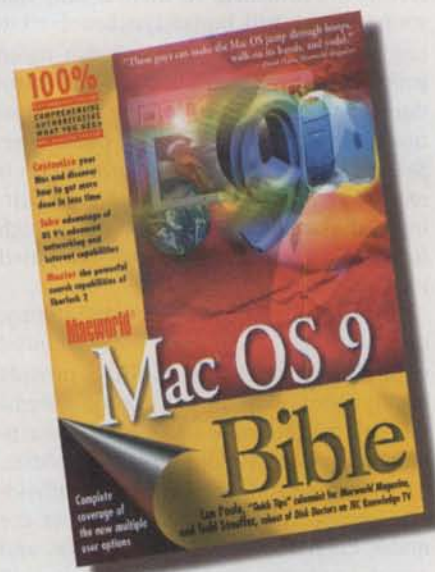
Just about all the content is relevant and accurate. However, there are a few obvious typos and editing slips. For example, it makes sense to mention the common

timesaving features and setting up for optimum DVD playback. However, the new features in Mac OS 9 could be more consistently and clearly identified.

Miser's advice is good, particularly in the sections on installing software and preventing and fixing problems. He writes with a light touch, finding room for a little humour. For example, his sample email takes the form of a complaint from himself about using complaints from himself as sample emails.

Stephen Withers

Author	Brad Miser
Publisher	Hayden Books
Contact	Pearson Education
Phone	(02) 9454 2319
Price	\$49.95
ISBN	0-7897-2312-3
Rating	★★★★



it is surprisingly easy to overlook things that save time or effort.

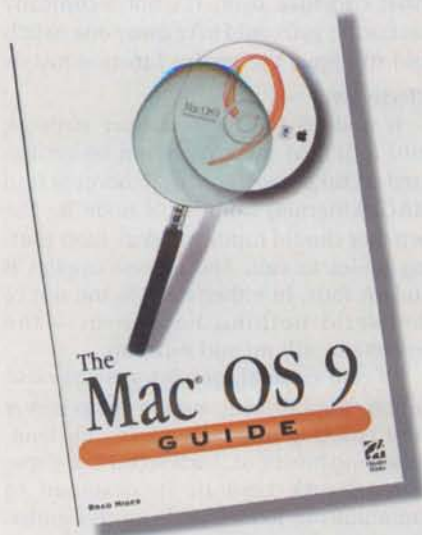
This is clearly a reference book and few people are likely to read it from cover to cover. The extensive index makes it easy to locate information to solve an immediate problem, but reading the entire chapter around that material is also worthwhile. As well as putting the problem in context, you are almost certain to acquire additional useful knowledge.

Macworld Mac OS 9 Bible isn't cheap, but the delayed release of Mac OS X means there is plenty of time to get your money's worth from the purchase.

Stephen Withers

Authors	Lon Poole and Todd Stauffer
Publisher	IDG Books Worldwide
Contact	Woodslane
Phone	(02) 9970 5111
Price	\$69.95
ISBN	0-7645-3414-9
Rating	★★★★☆

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dimensions in pixels of QuickTime movies, but including their conversion to inches as displayed on a 21in monitor set to 800 by 600 resolution doesn't add anything useful.

There's extensive coverage of Internet use, as well as valuable information about

Macworld Mac OS 9 Bible

At more than 900 pages long, this book is typical of the Macworld Bible series, and generally lives up to its promise of comprehensive and authoritative coverage.

Poole and Stauffer are both well known to the Macintosh community through their previous books and articles. The acknowledgments suggest that Stauffer was solely responsible for the Mac OS 9 revisions, but the book retains a consistent style.

The book claims that anyone with a few days' Mac experience will benefit from *Macworld Mac OS 9 Bible*, and that's largely true. Several sections might intimidate novices, but others will be immediately useful. The sections about the System Folder, Multiple Users, AppleScript, Sherlock and troubleshooting are particularly well written.

The chapter setting out the new features in Mac OS 9 is highly commendable, although cross-references to the details of each would have been useful. The 'What's Cool' chapter identifies useful features in Mac OS 8 and later, and will be valuable to those upgrading from System 7. People who have kept pace with Mac OS releases should also read it;

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The basics of Athlon processors — what you need to know. By Daniel Rutter

Step by Step

AMD's Athlon and Duron processors are attractive alternatives to Intel's processors. At the same clock speed, an Athlon is faster than a Pentium III. But they have their quirks, such as the Athlon's need for a different kind of motherboard to Intel CPUs. AMD's Duron and the high-speed Athlon (codenamed Thunderbird) are no exception. These chips have a new design and require an entirely different chipset to those used by the current generation Athlons. This further complicates upgrading, even for current AMD users.

Just as Intel has been shifting its Pentium III processors to the cheaper Socket 370, AMD is moving to a new design called Socket A. The recently released Duron uses a single-chip design, with all of the cache memory built-in. Earlier model Athlons and Pentium IIIs have separate cache chips, which is why they were sold in bulky cartridge form.

Socket A is used by all of AMD's Duron processors and will be used by most (if not all) Thunderbirds. It doesn't even have the same number of pins as Intel's Socket 370.

Switching from slot to socket

If you have an Intel processor and a Slot 1 motherboard, and you want to upgrade

to a Socket 370 processor, it's often possible to do so with simple adaptor boards — often called *slotkets*. These generally cost less than \$30. Even reasonably old motherboards can support older model Socket 370 Celeron processors on a slotket. Upgrading your old 266MHz Pentium II to a 433MHz Celeron can be worthwhile and surprisingly inexpensive.

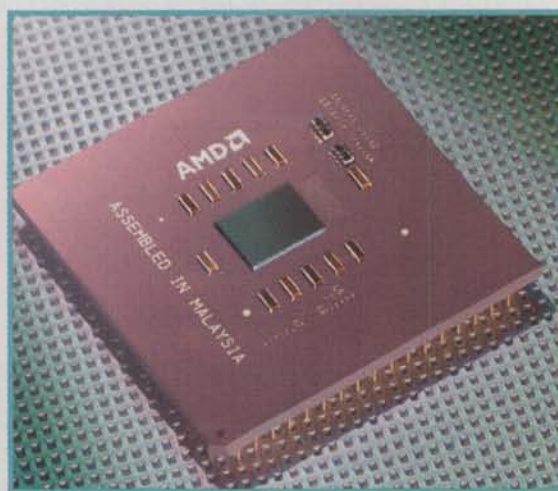
It would be good to be able to do something similar with the Duron and the Thunderbird, but it appears that current AMD users will have a much harder time upgrading within the platform. No slotkets exist for either CPU as yet — and they're never likely to. The Socket A motherboard that the Thunderbird will require won't use the same chipset used by the most recent version of the Athlon available in Australia. Current Athlons require VIA's KX133 chipset; Thunderbirds will require the new KT133 chipset (which was to be named KZ133).

It was understood initially that VIA would build Socket versions of the current KX133-based motherboards, but it changed its mind after compatibility problems between the Thunderbird and the KX133 chipset began to appear. For the same reason, AMD will make a limited number of Thunderbirds in the Slot A design for current customers, to ease the their transition from Slot A to Socket A infrastructure. They will only work on motherboards that use the older, lower performance AMD-750 chipset.

All these factors point to the likelihood that even current Athlon owners will need to get a new motherboard if they want to upgrade to newer AMD models as a simple adaptor board won't work.

Why go AMD?

The saving grace of the Athlons is their price; they are a lot cheaper than Pentium IIIs of equivalent performance. At the time of writing, you could buy a 750MHz Athlon and a \$300 motherboard to suit it, and still get \$300 change from the price of a single 800MHz Pentium III



The new Duron: faster than a Celeron, but another new motherboard type.

that provides similar performance.

The only components of an Athlon or Duron computer that differ from those in an Intel-based PC are the motherboard and the CPU. The same drives, cases, RAM and cards work just as well on either platform, but the awkwardness of motherboard switching prevents many people from upgrading to the new processors.

Upgrading your CPU alone is a simple affair. If a new CPU works on your old motherboard, you generally just yank out the old CPU, plug in the new one, and change a few jumper switches to attain the correct clock and voltage settings.

If you have to change the whole motherboard, not only do you have to yank and re-attach everything, if you're running Windows you'll have to completely reinstall the operating system. Reinstalling over the top of the old install so you keep your previously installed programs might work, but don't bet on it.

If you're undaunted by the technical nous required for the upgrade and want to go ahead, it might be a good idea to go for a higher rated power supply unit. Just about any 300-watt supply is likely to be OK. You should also check out AMD's what-to-buy list in Adobe Acrobat format online at http://www.amd.com/products/cpg/athlon/pdf/quick_ref_faq.pdf.

Daniel Rutter can be contacted at dan@dansdata.com.

AMD's new memory technology

The new Thunderbird processors can run on motherboards that employ Dual Data Rate (DDR) memory. This transfers data twice per clock cycle, giving twice the theoretical RAM bandwidth. You can use PC100 or PC133 SDRAM if you like (the price difference between basic PC100 and PC133 RAM modules is slight), but it won't be any faster.

DDR-capable motherboards, and RAM to put on them, should be available before the end of this year. Shoppers startled by the price of Rambus memory for motherboards based on Intel's i820 and i840 chipsets will be pleased to learn that memory manufacturers don't expect DDR RAM to cost a great deal more than SDRAM.

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Cat. 2621). Drive capacity may be up to 128GB. Data transfer rate is 400Mbps (IEEE 1394) and it supports Hot Swapping and plug-and-play. It is suitable for PC's with Win98 SE or Win2000 only.

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Cat. 2621	FireWire to PCI Host Adapter	\$197

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Cat. 2808	HDD Hot Swap IDE RAID Disk Array	\$1176
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Network tester with LCD Display



An intelligent continuity tester for LAN cables that saves time on the job. It tests a range of Modular cables including 10Base-T (Category 3-5). The LCD

display shows the pin connections as well as the wiring scheme detected.

Cat. 11519	Network Tester with LCD	\$187
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PS/2 Keyboard & Mouse Adapter

Turns your laptop into a desktop with a single, pocket size adapter. It allows the use of a keyboard and a mouse from a single port!



Cat. 15093	PS/2 Keyboard & Mouse Adapter	\$169
Cat. 15094	USB Keyboard & Mouse Adapter	\$140

Dual Mouse Adapters



Use 2 Pointing Devices from 1 PC! Left & right handed mice, trackballs, touch pads, etc. Each has its strengths. Now you can maximize your computing

experience by connecting your two favourites and switching instantly between them as you work. Choose between PS/2 and serial connection models.

Cat. 15090	Dual PS/2 Mouse Adapter	\$111
Cat. 15097	Dual Serial Mouse Adapter	\$111

Dual Keyboard Adapter

Need input from two locations or need a specialized and standard keyboard? Here is the answer!

Cat. 15091	Dual PS/2 Keyboard Adapter	\$111
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Dual Monitor Adapter

The best way to attach two monitors to one computer. Not only does this adapter split the (S)VGA video signal, it boosts it for optimum image quality. It will support resolutions up to 1280 x 1024 and up to 32-bit color (4 billion colors). Perfect for presentations - use one monitor for the presenter and the other for the audience.



Cat. 15092	Dual Monitor Adapter	\$216
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SmartMedia Reader/Writer

A SmartMedia (as used with digital cameras) reader/writer which connects to the parallel port to allow fast transfer of your photos to your computer. The reader appears as another drive on your PC, just use Windows Explorer to copy the files.

Cat. 6603	SmartMedia Reader/Writer	\$263
Cat. 6457	PCMCIA & Compact Flash Reader/Writer Parallel Port	\$218
Cat. 6489	PCMCIA & Compact Flash Reader/Writer USB	\$187

Smart Card / Magnetic Card Reader



The module is ideal for a wide range of applications, including vending machines, gaming, ATM transactions, security access system, electronic wallet systems

& customer data management systems. It uses a ddm 862-hybrid card acceptor that has one push-pull magnetic card reader and one chip card connector. The magnetic card reader is standard with dual track 2/3. The unit comes standard with one User IC Card and 3 SAM card acceptors.

Cat. 8901	Smart Card / Mag Card Reader- OEM	\$689
Cat. 8899	Smart Card Reader / Writer - Serial	\$160

PCMCIA to FireWire Converter

High performance Cardbus to Firewire adapter for MAC, Windows SE98 and Windows 2000 only. Cardbus is the 32 bit version of the PCMCIA interface, which is 16 bit. It lets you connect DV Camcorders, DV Corders, CCD cameras and Professional Digital still image cameras etc to your Notebook. It will support up to 63 IEEE1394 FireWire devices and provides a true high performance I/O solution for users that are demanding the IEEE1394 consumer and professional devices. Upgrade software* is available at the time of purchase.



Cat. 2821	PCMCIA to FireWire	\$312
Cat. 2823	FireWire & USB Combo Card	\$281
Cat. 2621	FireWire to PCI Host Adapter	\$197
Cat. 70406	*MediaStudioPro V6.0 VE	\$140

2 Port USB PCMCIA Card

No USB Port on your Notebook PC? Just slide this PC Card into your notebook and, instantly, you can begin connecting USB peripherals. NO complex installation, confusing plug-ins, or IRQs. PC Card enables any Notebook PC with Card Bus Slot to connect USB products.



Cat. 2810	Two Port USB PCMCIA Card	\$180
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Just do it yourself

When **Ashton Mills** set about overclocking his Pentium III 450MHz, he discovered that souping up your CPU can take as much brawn as brains.

It's 14°C in my room right now. I know this because my hardware monitor is measuring the temperature of the CPU in my PC. I just turned it on, so it's safe to assume my beloved processor is as cold as I am. But not for long.

My Pentium III 450MHz is humming along nicely at 558MHz, and has been for many months. Apart from generating lots of heat, overclocking my CPU has generated 108MHz of Pentium III goodness for free. This is a significant improvement in performance. And performance, to a geek like myself, is what it's all about.

The core meltdown

Overclocking isn't exclusively the domain of the insane or technologically obsessed; anyone can benefit from overclocking. However, there's a borderline between effective overclocking and recklessly endangering the CPU for little appreciable gain.

It helps to understand how your CPU operates and how the two core players — the clock multiplier and frontside bus (FSB) — work together to determine how fast your CPU should run. The FSB governs the speed at which the memory and CPU communicate. Intel processors always generate their ticketed speed by running at multiples of the FSB. For instance, a 500MHz CPU can run on a 100MHz FSB with a 5x multiplier. Your CPU's ticketed speed only reflects what the manufacturer's quality assurance testing deems is safe for the CPU to run at; if you improve its working conditions, it's probably capable of handling a higher speed.

The amount which you can run a processor above its specification is in direct proportion to your machine's ability to dissipate the extra heat generated by doing so. Theoretically, there is no limit to how much you can overclock — the more heat your machine can dissipate, the faster it can run your processor. This is why some overclockers (the rather more obsessive ones) invent new machinations to improve heat dissipa-

tion, such as a water cooling system that runs water into the machine through a jacket sitting on the CPU. Or, more ambitiously, a freezer in which to put components. One group of truly dedicated overclockers has even successfully submersed a whole system in refrigerated mineral oil — all in the name of speed.

Cool equipment

Sometimes the default cooler that comes with Intel CPUs will handle a little overclocking and remain stable, but if you're serious about squeezing out more performance, you'll need a far more powerful cooling device.

When I purchased my Pentium III 450MHz many moons ago, I did so with the intention of overclocking it. Barely a week after I had installed my new Pentium III I went looking for a suitable cooler online. I eventually settled on the **TennMax P3 TF**, a twin-fan aluminium heat sink cooler that was highly recommended by the hardware sites I visited. As a starting point, check the handy list of hardware sites on the next page.

After forking out to buy and ship the cooler from the US (many brands are now available much more cheaply in Australia), I sat back and waited for it to arrive. This involved playing lots of games on my new CPU — just to 'burn it in', of course.

When it finally arrived, I put the kettle on, locked all the doors, took the phone off the hook and dug up the following.

- A flathead screwdriver and screw
- A small pair of wire cutters/strippers
- A torch (PC cases are dark)
- Some cable/zip ties (the wonder tool);
- Plenty of munchies
- A complete disregard for the monetary value of any parts involved in the operation

I was ready.



The deed

Overclocking the CPU was going to be easy; it's just a matter of setting a new FSB in the motherboard's BIOS, and then testing to make sure that the CPU can run stably at that speed (check your motherboard manual for instructions on changing your FSB). The biggest hurdle was going to be attaching the new cooler so the CPU could handle the increased heat generated by the higher frequency.

My first stumbling block was the fact that most coolers are designed for OEM (original equipment manufacturer) CPUs — that is, CPUs without the stock Intel cooler that's built into the cartridge. My first task was to remove this obstruction.

This was not going to be easy, because the cartridge wasn't designed to be removed. Intel publishes instructions on its Web site for removing the SECC 2 cartridge, but it involves complex and expensive equipment. I was obviously going to have to improvise.

Removing the fan and heat sink was easy; the fan unclips at the sides and the heat sink is held in place by four plastic pins which break easily. The next step was a lot harder. Although I now had a bare CPU on one side, the rear of the cartridge remained firmly attached to the PCB (printed circuit board), and the four pins and holes it was using to do this were needed by my new cooler.

The hardware sites document a process whereby it's possible to remove the cartridge using nothing but a trusty screw-

driver, a screw and little bit of force. Removing the cartridge is, they say, easy if the four central pins that connect the rear cartridge to the front of the PCB are forced out by screwing the screw into the four visible end points of the pins in the back.

I did this and quickly found it wasn't getting me very far, so I started to apply *firm* pressure. When this failed, and even sheer force didn't push any of the pins out, I revised my attack on the cartridge. I applied a slight, well, *hammering* pressure. Eventually, the plastic pins began to shift, but only after I had repeatedly hammered my \$600 CPU directly into my desk. At this stage I had no idea if the bludgeoning had rendered it brain dead, but if it turned out that my CPU was destroyed, I would have put this down to (very costly) experience.

After much sweat and many munchie breaks I managed to break two of the pins free of the back, while the other two hung on by weak, mangled plastic. Given that I could now insert the screwdriver in the growing gap and pry it open a little, these pins didn't last long. Finally, after removing the remainder of the SECC 2 cartridge, I had a naked Pentium III.

Before I could attach my brand new cooler, I had to remove the heat-conductive grease that covered the CPU die. As it's a very gooey substance, it was easiest to remove by scraping it to the edges of the die using a flathead screwdriver and *extreme* care. It may be better to use a more delicate tool if you're not confident with your surgical skills. After about 20 minutes of carefully scraping the grease away, I used a soft cloth to wipe off the remaining residue and polish the die to a shiny, smooth surface.

Attaching the cooler

An OEM CPU looks exactly the same as the full retail version except that the heat sink and fan are missing. Attaching the new cooler would be a challenge because all Pentium III coolers rely on the rear plastic backing to attach themselves, just like the stock Intel cooler did. By now, this essential piece of equipment lay mangled on my desk.

According to the hardware sites, you can get away with not using the plastic backing by simply finding replacement struts to support the pins from the cooler on the rear of the PCB. Logically, you can use anything, just as long as it matches the length of the pins so the cooler can lock firmly onto the CPU. The sites suggest

small rubber tubing, which is available from hardware shops. To save time, I decided to find an alternative. The only thing that came close was the plastic tube of a biro, cut up into four separate tubes of equal length. However, as the hard plastic that these pens are made of will crumble and splinter long before giving you a straight edge, it is nearly impossible.

I turned my attention back to the mangled SECC 2 backing. Also noted online is the poor design of Intel's cartridge. Sure, heat from the CPU die is conducted directly up into the heat sink, but a fair amount of heat is also generated on the underside of the PCB, and Intel's plastic backing traps this heat. I knew that any *real* overclocker would make sure there was ventilation for the rear.

All I really needed were the four, slightly mangled pin supports to tightly secure the new cooler. Using my cutters, I repeatedly crunched into the hard plastic backing until I had separated the support plastic I needed. There was definitely no going back now. If my new cooler didn't fit, there was no way I would be able to re-attach the Intel cooler.

After a little filing to remove the rough edges, the supports fitted perfectly (as you'd expect). Not only had I managed to attach the new cooler tightly, but I had also done so without the entire plastic backing an OEM CPU would still have attached. As a result, air could circulate to the rear of the CPU. I didn't have to apply any heat sink grease to the CPU, because the new cooler came with its own heat-conductive pad (also known as a 'thermal phase change interface pad').

I was almost ready to test it. I had to plug it in, but without the helpful Intel cartridge, I couldn't just 'snap' it into the support struts. Enter the cable ties. These are small threads of plastic with grooves on one side and a pegged loophole on one end. Sliding the thread through the hole creates a loop that can be tightened, and won't slip undone. There are hundreds of uses for these ties, and I used one to secure my new super-cooled CPU to the Slot 1 connector in the motherboard.

Testing the rig

I spent some time playing with the FSB speed in the BIOS trying to find out how far I could overclock my CPU. It turns out I could reach near 600MHz, but not stably (I ran various tests to ensure stability). Eventually I settled on an FSB of 124MHz, which runs the CPU at 558MHz and gives a handy boost to both my PCI and AGP

Hardware sites

Ars Technica

<http://www.arstechnica.com/>

BXBoards

<http://bxboards.com/>

Overclockers.com

<http://www.overclockers.com/>

Overclockers Australia

<http://www.overclockers.com.au/>

Tom's Hardware Guide

<http://www.tomshardware.com/>

buses, slightly increasing overall system performance. Even in summer, when the room temperature is hotter, my machine runs fine at 558MHz. For the cost and effort, 108MHz of speed isn't bad, considering a true 550MHz Pentium III is considerably more expensive.

There are two major considerations when it comes to overclocking. First, a cooler is only as effective as its ability to conduct and dissipate heat away from the CPU. Quality coolers are more efficient at drawing up heat into the heat sink and passing it into the surrounding air. Second, your cooler can only attempt to bring your CPU temperature in line with that of its immediate environment. In most instances this will be the stifling warmth of your computer case.

To ensure that there is adequate airflow and to effectively allow the CPU to share the cooler environment outside the case, many overclockers run their machines with the case open. A better alternative is to have fans sucking air into and out of the case, preferably in a way that allows air to cycle around your case before it exits, thus cooling all your peripherals as well as your CPU. No amount of cooling hardware will be of benefit unless you allow colder air from outside the computer to circulate inside the case.

Coolers today are generally easier to install. If you don't mind fiddling around with your PC, overclocking is well worth the time invested. And it's fun, too.

Overclocking is covered in more depth in APC's *Upgrading Pocketbook* (see <http://apcmag.com/shop/>).

Ashton Mills is editor of APC

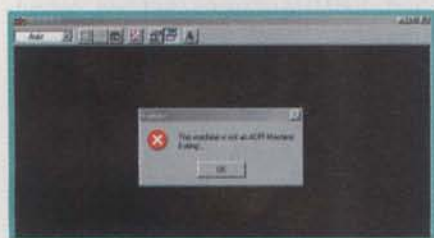
Pocketbooks. He can be contacted at amills@acptech.net.

Windows

This month, Workshop looks at how Advanced Configuration and Power Interface (ACPI) improves power management on compatible Windows 2000 systems. We also begin our investigation into Windows 2000 security, starting with user accounts and passwords.

ACPI

ACPI is an industry-wide specification (developed cooperatively by Intel, Microsoft and Toshiba) that improves the way computers manage power. ACPI specifies how the operating system, motherboard and BIOS communicate with each other about power management.



Use the ACPIHCT program to see if your computer is ACPI compatible.

The specification is a response to the environmental and financial costs of power use. Power management is also of great concern to mobile computer users who want to get the most out of their system's limited battery life.

The Advanced Power Management (APM) system found in previous versions of Windows mainly relies on the BIOS to determine when a particular device has been idle long enough to reduce or remove power. The operating system's only role is in setting how long a device should remain idle before reducing its power.

ACPI relies much more on the operating system. The OS uses a sophisticated demand-based system to make power management decisions. The OS can turn hardware on and off, depending on whether it's needed. An ACPI machine manages power usage in several ways. A CPU's clock speed can be reduced if the running applications don't require full processing power. Any software that is running can be analysed so that the operating system knows what devices are needed. The battery levels of mobile computers can be moni-

tored and, when they fall to a certain level, the power management policies can be adjusted to reduce power to less critical components of the system.

ACPI has been in development since 1997 and is available in Windows 98, but hardware that supports it wasn't widely available until recently. Generally, only systems made in the last year are ACPI compliant. Therefore, ACPI is not always automatically enabled by the operating system. Some systems may only be able to make use of ACPI after a BIOS upgrade. If you upgrade your BIOS, you need to reinstall Windows 2000 to enable ACPI support.

To check whether your machine is ACPI compliant, run the ACPI Hardware Compliance Test on it. This program can be found in the Workshop section of the cover CD.

If you suspect that your machine requires a BIOS update to be ACPI compliant, then you can search for one using Microsoft's Windows 2000 Search for Compatible Computers Web site, (<http://www.microsoft.com/windows2000/upgrade/compat/search/computers.asp>). Enter details about the manufacturer and model of your machine and the search tool will tell you if it is ACPI compatible. If your BIOS needs upgrading, it will provide links to manufacturers that can explain what you must do. If you have a custom-built PC, you will have to check with the individual BIOS and hardware component manufacturers to see if they can be updated.

For Windows 2000 to automatically enable ACPI, your BIOS' hard coded version date must be 1/1/99 or later. Windows 2000 also checks your BIOS against a Bad BIOS list to ensure that it is not one known to have compatibility problems.

An ACPI-compliant machine can make use of Windows 2000's hibernate and standby options. You can enable these options in the Control Panel's Power Options dialog box, which will then make them available from the Shut Down menu. Laptop users can also choose to have their system hibernate or go to standby mode when idle for a certain amount of time.

When you put your system into hibernation, the contents of your RAM are written to the hard disk. When you turn the computer back on, the boot time is reduced and your desktop reverts to the way it was before hibernation. When put on standby,

A quick guide to ACPI and an introduction to Windows 2000 security. By Kieran McNamee

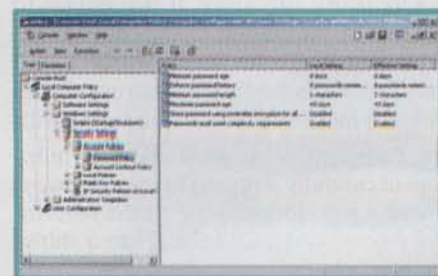
your computer switches to a low power mode and quickly resumes when you need to use it again. Standby does not write any details to the hard disk, so if there is a power failure you will lose any unsaved data and will have to reboot normally.

The uses for ACPI at present are limited, but they will expand in the future. ACPI is the foundation for the OnNow industry initiative, which allows system manufacturers to build computers that will start up at the touch of a key. An OnNow machine will make your system available in seconds rather than minutes.

Windows 2000 security

Security is an important issue in all aspects of computing. Viruses, denial of service attacks, and employees gaining access to sensitive data, can all be an administrator's nightmare.

Windows 2000 has many security features. The crux of Windows' security on a local computer is user accounts. When you first install Windows 2000 you are asked to



Enforce a strong password policy to keep out unauthorised users.

supply an administrator password. The administrator is the most powerful user level of Windows 2000; the operator has unrestricted access to the computer. For this reason, the Administrator account should only be used by trusted individuals, and even then, only to perform special tasks.

Each user of Windows 2000 should have their own username and password. This can be done on a single machine, but in a corporate network environment it's usually done by a Windows 2000 server that stores the accounts along with each individual's access rights.

We'll focus on a standalone machine. Individual users of a machine can be set up easily in the Control Panel, but to ensure

Mr America



American Pie





Bill Gates: Brussels, February 4, 1998



Australian Personal Computer

B

Windows Keyboard

SHORTCUT KEYS FOR THE DESKTOP

(will not work in other applications)

Rename a file **F2**

Find a file **F3**

Delete a file or shortcut **Del**

Delete a file or shortcut and don't
place in Recycle Bin **Shift-Del**

Bypass StartUp programs during boot **Ctrl**

WORKING WITH WINDOWS

Exit an application **Alt-F4**

Close a window **Alt-F4**

Help **F1**

Switch between windows **Alt-Tab**

(press and hold **Alt**)

Maximise **F5**

Minimise **F6**

EDITING TEXT

Delete current word **Ctrl-Del***

Delete to beginning of current word
Ctrl-Backspace*

Delete current line **Alt-Backspace***

Undo last edit **Ctrl-Z***

Redo last edit **Ctrl-Y***

WORKING WITH WINDOWS

Display the Start Menu **Ctrl-Esc**

Windows

Shortcuts

WORKING WITH APPLICATIONS

Exit an application **Alt-F4**

Close a crashed application/exit Windows **Ctrl-Alt-Del**

Help **F1**

Switch between currently running applications **Alt-Tab**
(press until required application is selected)

Maximise the current application **Alt-Spacebar then X**

Minimise the current application **Alt-Spacebar then N**

WORKING WITH DIALOG BOXES

Move forward to next item **Tab**

Move back to previous item **Shift-Tab**

Move to previous dialog tab **Ctrl-Shift-Tab**

Move to next dialog tab **Ctrl-Tab**

Select a dialog button **Enter**

Select a radio button

or checkbox **Spacebar**

Cancel dialog box **Esc**

Drop down list of file locations **F4***

ce*

Move to previous dialog tab **Ctrl-Shift-Tab**
Move to next dialog tab **Ctrl-Tab**
Select a dialog button **Enter**
Select a radio button
or checkbox **Spacebar**
Cancel dialog box **Esc**
Drop down list of file locations **F4***

Esc then Tab

Most of the above commands also work to move between and select browser links.

Alt-M
(shows key)

BROWSER SHORTCUTS

(supported in both Navigator and Internet Explorer)

Reload current page **Ctrl-R**
Go back a page **Ctrl-Left arrow**
Go forward a page **Ctrl-Right arrow**

ab

THE CLIPBOARD

Select all **Ctrl-A***
Copy **Ctrl-C**
Cut **Ctrl-X**
Paste **Ctrl-V**

COMMON DOCUMENT OPERATIONS

Save the current file **Ctrl-S***
Open an existing file **Ctrl-O***
Create a new file **Ctrl-N**

ay not work
rth trying.

Australian
**Personal
Computer**

Ctrl-Backspace*

Delete current line **Alt-Backspace***

Undo last edit **Ctrl-Z***

Redo last edit **Ctrl-Y***

WORKING WITH WINDOWS

Display the Start Menu **Ctrl-Esc**

Access the Taskbar/Quicklaunch bar **Ctrl-Esc then Esc then**

Access a selected Taskbar application **Enter**

Minimise all windows **Ctrl-Esc then Esc then Alt-M**

Right click/properties **Shift-F10 (or right Windows key)**

WINDOWS KEY SPECIALS

Start menu **Windows key**

Windows help **Windows key-F1**

System properties **Windows key-Break**

Cycle through taskbar buttons **Windows key-Tab**

Windows Explorer **Windows key-E**

Find dialog **Windows key-F**

Run dialog **Windows key-R**

Minimise all windows **Windows key-M**

Undo minimise all **Shift-Windows key-M**

THE C

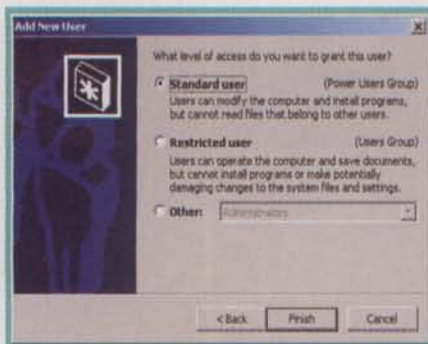
Select a

Copy

Cut

Paste

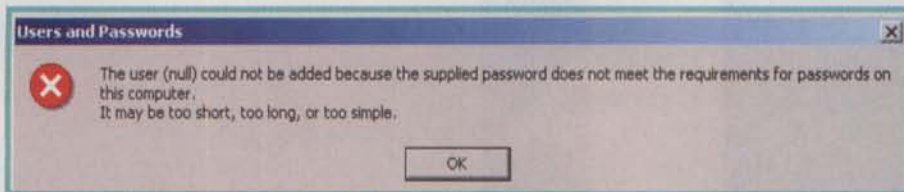
***Options marked with an asterisk may not work in all programs, but are always worth trying**



Don't give a user access they don't need.

maximum security, Windows 2000's Group Policy also needs to be used. First, you need to create the user accounts.

To add, remove or change users of an individual Windows 2000 machine you have to log on as Administrator. Go to the Control Panel and open Users and Pass-



Make sure all user passwords are strong.

words. When you click on the Add button you will be asked for a username, full name and description. The full name and description are not important, but be sure to use a meaningful username. Enter a password for the new user. This can be changed by the user when they first log on.

Next, specify what level of access the user will have. The two main ones are Standard user and Restricted user. A standard user can modify the computer and install programs, but cannot read files that belong to other users. A restricted user can operate the computer and save documents, but cannot install programs or make potentially damaging changes to the system files and settings. It's up to you to decide what level of access to grant.

After creating the individual users, click on the Advanced tab and then on the Advanced button under the Advanced User Management heading. In the Users folder you will find a list of all the users you have created. Double-clicking on a user will bring up a Properties window. Check the 'User must change password at next logon' button here so that they can enter their own password. Other options in the user Properties window are the 'Account is disabled' option, which prevents the user from logging in, and the 'Password never expires' option, which ignores the maximum password age specified in the Group Policy.

The Group Policy is the administrator's main tool for controlling user accounts. Editing the Group Policy can be done through the Microsoft Management Console (MMC). To open the MMC, click on Run in the Start menu and enter MMC. The MMC tools help with the administration of the computer along with the network and any services that are running. These tools are known as snap-ins, and many are not intended for administering an individual local computer. In fact, some snap-ins require you to install Windows 2000 Server before you can use them.

To add the Group Policy, select Add/Remove Snap-in from the Console menu. Click on Add and select Group Policy from the list. Once you click OK in the Add/Remove Snap-in window, the console root displays the Local Computer Policy.

Passwords are often the weakest point in a computer system's security, but with a strong password policy in place you reduce the likelihood of an unauthorised user accessing your system.

To create a strong password policy, go to Computer Configuration, Windows Settings, Security Settings, Account Policies. Under Password Policy there are a number of self-explanatory settings to choose from. A minimum password length should be specified and, if at all possible, the complexity requirements should be enabled.



Access users and passwords settings through the Control Panel.

Windows shareware

Dictionary 2000 5.1

Translate to and from 13 different languages.

HyperSnap-DX 3.61.00

Capture screen images — even from games — using 3dfx.

Virtual Turntables

1.80.04

Mix your favourite tunes and become a virtual DJ without all the expensive equipment.

WizFlow Flowcharter 3.0d

WizFlow Flowcharter makes creating flowcharts a breeze.

ZoneAlarm 2.1.25

A personal firewall for your computer, and it's free.

All these packages can be found on this month's cover CD, along with more detailed reviews.

Your users might not be able to have the simple passwords that they prefer, but it will help keep your system secure.

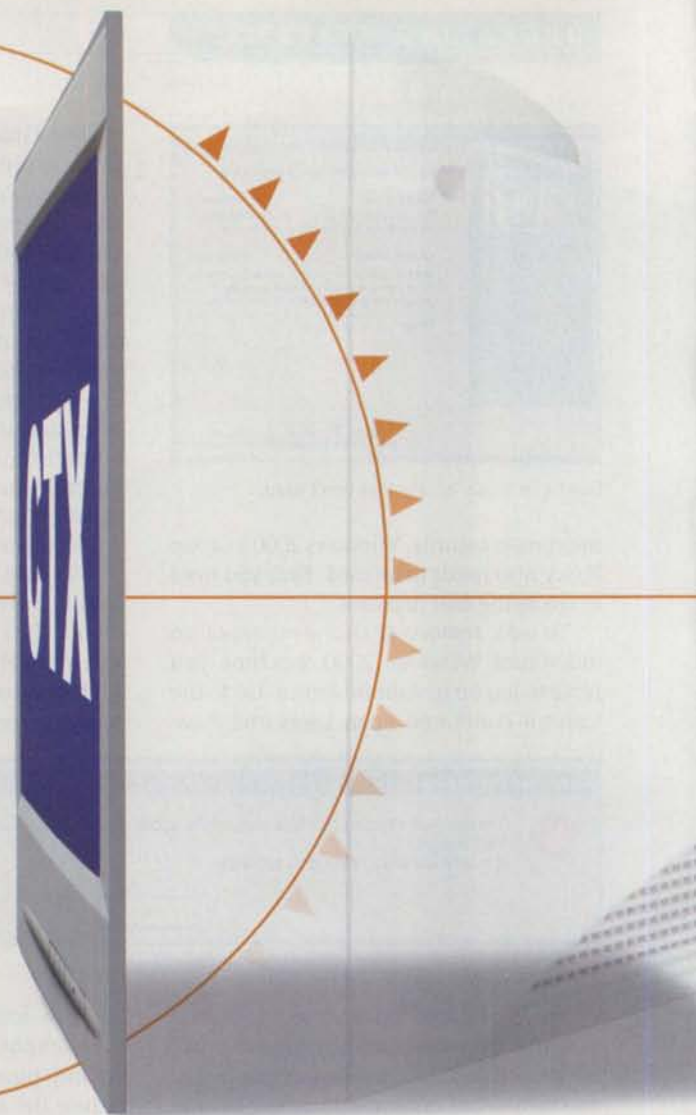
Under the Account Policy option, set how many logon attempts a user can perform before they are locked out of the system. This will help reduce the chance of unauthorised users hacking into your system by experimenting with a number of passwords.

Locking your computer is a simple and effective way of keeping it secure when it is unattended. There are a couple of ways you can lock the computer with a password when it's not in use. The first is to press Ctrl-Alt-Delete and select Lock Computer. The second method is to set up a password-protected screensaver through the Display option in the Control Panel.

Next month we look at the added security that the NT file system provides, along with Windows 2000's encryption and Internet security features.

Kieran McNamee can be contacted at kmcnamee@acp.com.au.

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• Effectively reduces reflection • Consistent colour and brightness • 0.24mm dot pitch



Other Flat CTX Flat Other Flat CTX Flat CTX Flat

• Super-fine resolution • Distortion and concave-free image



Other Flat CTX Flat Other Flat CTX Flat

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Ocean Delivers



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That's why, the philosophy
and belief of Ocean remains
the same.

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- Be reliable, be consistent

We believe

- Help them reduce TCO
(Total Cost of Ownership)
- Lower their cost of maintenance
- Lower their unproductive downtime
- Simplify upgrades
- Simplify integrations
- Provide better support
- Above all, give better value for money



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- System Management Instrumentation
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- Intel® SC5000 Server Chassis (5 Hot Swap bays)
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- Sony 1.44MB FDD
- Microsoft Intellimouse
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Use Linux shell redirection to manage your programs' input and output sources. By Geoffrey Bennett

Linux

In this series of articles, we take a look at two facilities that the Linux shell provides: redirection and piping. This article goes back to the basics and explains how it works.

Standard input, output, error

When you run any program from a Linux shell prompt, the shell automatically makes three means of communication available to that program. These are known as standard input (stdin), standard output (stdout) and standard error (stderr). By default, all three are 'connected' by the shell to your keyboard or screen.

As a simple example of this, we'll use `bc`, a handy tool for doing calculations. Below is an example session with `bc`. What you type is shown in bold.

```
$ bc
1+2
3
2970/(16+74)
33
1/0
Runtime error (func=(main), adr=3): Divide
by zero
```

Press Ctrl-D when you've finished.

Because every program is automatically connected to stdin, stdout and stderr (which are connected to your terminal by the shell), there is no need to make any special arrangement with the operating system for `bc` to communicate with you. Figure 1 shows the flow of data in and out of `bc`.

Although we called stdin, stdout and stderr three means of communication, in Linux terminology they are *file descriptors*. You wouldn't usually think of your screen and keyboard as files, but from a pro-

gram's perspective there is absolutely no difference between writing to a file on disk or writing to your screen. In both cases, a program tells the operating system what file descriptor it wants to write to and what data it wants to write, and the operating system takes care of the rest. Simi-

Redirection

larly, reading from a file on disk and reading from your keyboard are identical operations from the program's point of view. This is important because it means that where a program's input comes from and where its output goes to can be changed without the program knowing about it.

```
1+2
2970/(16+74)
1/0
```

Now type `bc < calculations`, and you should get the following output.

```
$ bc < calculations
3
33
Runtime error (func=(main), adr=3): Divide
by zero
```

The output from `bc` is identical to our previous example, only this time the input came from a file instead of a terminal.

Redirecting standard output is done in a similar way. For example, type the command below and press Ctrl-D when you've finished.

```
$ bc > results
1+2
2970/(16+74)
1/0
Runtime error (func=(main), adr=3): Divide
by zero
```

If you then type `ls -la results` and `cat results`, you'll see that the results of the calculations (but not the error message) ended up in the results file.

As a way to remember whether to use `<` or `>`, think of the symbol as an arrow indicating whether data should be going from a file into a program (program `<` inputfile) or from a program into a file (program `>` outputfile).

There is a separate file descriptor for errors, so that you can see errors on your

screen rather than interspersed with valid output in a file. It might not make much difference in our example, but could be handy if the calculations script is a few thousand lines long.

To redirect standard error, use `2>`. It works in the same way as `>`.

```
$ bc 2> errors
1+2
3
2970/(16+74)
33
1/0
```

You can use two or three redirection operators at once.

```
bc < calculations > results 2> errors
```

You won't see any output (it'll be in the results file), or any errors (they'll be in the errors file), and you won't be prompted for any input (because it came from calculations).

The order of redirections here is not important; the above example is the conventional way to do it, but the command line below does the same thing.

```
bc 2> errors > results < calculations
```

Appending to a file

In the above examples, if the files' results or errors had previously existed, they would be emptied by the shell before it started `bc`. To append to a file instead of overwriting it, you could use `>>` instead of `>`.

```
bc >> results 2>> errors
```

If either file doesn't exist beforehand, it will be created.

Advanced redirection

Sometimes you want the output mixed in with any error messages. The obvious (but wrong) thing to type is `$ bc > results 2> results`. That command doesn't work as you might expect it to, for a rather technical reason; for every file descriptor, Linux keeps track of a *file pointer* which says where within the file the next read or write will come from (obviously your keyboard doesn't have a file pointer that can be changed

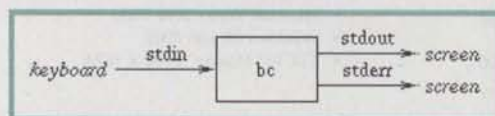


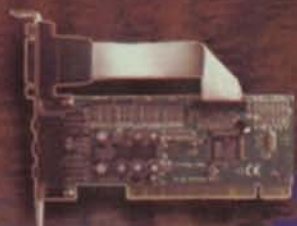
Figure 1: The standard file descriptors

gram's perspective there is absolutely no difference between writing to a file on disk or writing to your screen. In both cases, a program tells the operating system what file descriptor it wants to write to and what data it wants to write, and the operating system takes care of the rest. Simi-

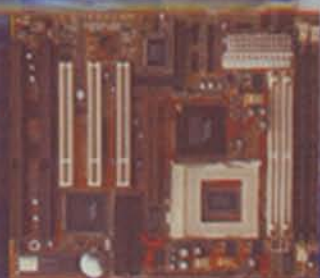


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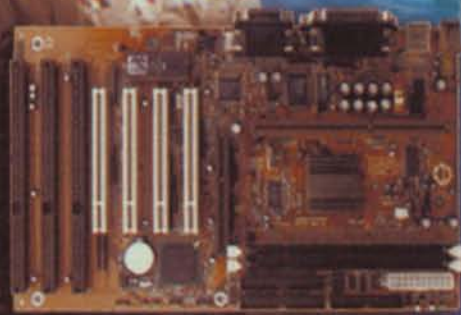
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WELCOME

Linux shareware

This month, Linux shareware includes the latest 3D drivers for current and previous 3dfx, nVidia and Matrox video cards, as well as a host of game demos, updates and add-on packs for Linux Unreal Tournament. Here's some of what you'll find on this month's CD.

Parsec demo

This is a non-playable teaser movie for Parsec, a space flight and dogfighting game similar to Privateer or Wing Commander.

Unreal Tournament add-ons and updates

Unreal Patch 413a, Unreal Tournament Bonus Pack for Linux, Unreal Deathmatch Converter for Linux Unreal Tournament, Unreal for Linux, Unreal Tournament Innox Maps for Linux

Railroad Tycoon II

Build railway empires in the heyday of the US railroad system with this strategy game.

Quake III Point Release

This is the latest Quake III update, version 1.17.

All these packages and more can be found on this month's cover CD, along with more detailed reviews.

by a program). Because the shell opens the files separately, Linux keeps track of the file pointers for standard output and standard error separately. When `bc` writes something to standard output, the file pointer for standard error will still point to the beginning of the file. Now any errors written by `bc` will go at the start of the file, overwriting the output that was placed there just before.

The solution to this problem is to duplicate a file descriptor so that the two of them share the same file pointer. To do this, use the redirection operator `2>&1` in the manner shown below.

```
bc > results 2>&1
```

The command above means 'send standard output to results, and then make stan-

dard error a duplicate of standard output'. Because one file descriptor was created as a duplicate of the other, they share the same file pointer and there is no problem with the output and errors overwriting each other.

Although the order of redirections did not matter before, it does when duplicating file descriptors. If you write the above command in the following manner, the output will go to results as you'd expect, but the errors will appear on your terminal.

```
bc 2>&1 > results
```

This happens because standard error is made a duplicate of standard output (ie. your screen), and when standard output is redirected elsewhere, standard error stays

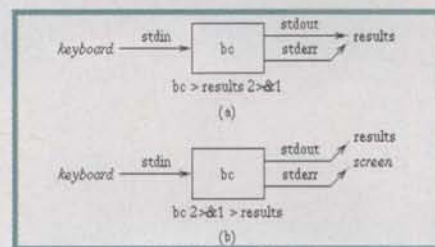


Figure 2: Duplicating file descriptors

pointing to your screen. Figure 2 (a) and (b) shows the effects of the `2>&1` operator.

The shell allows you to write `> results 2>&1` as a shorthand for `>& results`. You can simply type `bc >& results` instead.

File descriptors as numbers

A file descriptor is represented by a number, which is assigned by the kernel when a new file is opened. By convention, standard input is 0, standard output is 1 and standard error is 2. This is why you use `2>` when redirecting `stderr`. In fact, instead of `<` and `>` you can write `0<` or `1>`. You can even ask the shell to open extra file descriptors with, for example, `3>`, but it is unusual to need to do this.

Redirection examples

So far we've only used the `bc` program in our examples, but nearly every program can have its input and output redirected in similar ways. It doesn't make sense to do redirection with some programs; for example, a screen-oriented program like `vi` will have all sorts of terminal control codes in its output. Also, some programs open the `/dev/tty` special file mentioned before, so they can talk directly with you. The `passwd` program is one of these.

The `echo` command writes its arguments to standard output, so to place a

particular message in a file, use the command line below.

```
echo "This file is intentionally left blank." > blank-file
```

To create a multi-line file, use the `>` operator to append additional lines:

```
echo "First line" > test-file
echo "Second line" >> test-file
```

The `cat` command is one of the simplest Linux commands. It copies its input to its output — not very exciting, but useful. For example, to place text into a file from your keyboard, run the following command: `cat > test-file`. When finished, type `^D` at the start of a line. To display a file on your screen, type `cat < test-file`. You can also use it to copy files: `cat < source > destination`.

Like many Linux programs, if you give `cat` a filename as an argument, it will open the specified file itself and read from that file instead of from standard input, so strictly speaking, the `<` operator could have been left out of the two commands above for the same overall effect.

Here are two final examples that are particularly helpful. To mail someone a file, type the line below.

```
mail -s "My subject" myfriend@example.com < my-file
```

And to put the current date (in `yyyy-mm-dd` format) into a file, type the following.

```
date +%Y-%m-%d > timestamp.
```

Summary

The following four examples summarise the redirections covered in this article.

- To redirect input from a file into a program, type `program < file`.
- To redirect output from a program into a file, type `program > file`.
- To redirect errors from a program into a file, type `program 2> file`.
- To redirect output and errors together from a program into a file, type `program >& file`.

A list of special files to use with the redirection operators is included on cover CD 1. Next month, we look at using pipes to move data directly between programs.

Geoffrey Bennett can be contacted at geoffrey@netcraft.com.au.



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Use Location Manager to change your Mac settings at home and on the road. **By Stephen Withers**

Mac OS

Location Manager allows you to change many settings in one go and, as the name suggests, was originally designed for mobile users.

Location Manager is found in the Control Panel folder. If it isn't there, you're probably using a version of Mac OS earlier than 8.0 on a PowerBook or 8.1 on a desktop Mac or uninstalled it. Alternatively, you might have decided you didn't need it and trashed it. If this is the case, dig out your Mac OS CD-ROM and reinstall Location Manager.

Location Manager 2.0 is part of Mac OS 8.5 and later and controls the following settings: AppleTalk & TCP/IP, Auto-Open Items, Default Printer, Extension Set, File Sharing State, Internet Set, Remote Access, Sound Level and Time Zone.

Auto-Open Items is similar to the Windows Startup Items folder, but the items (applications, documents, volumes) you specify are opened when you switch to this location. Extension Set activates sets you have defined within Extensions Manager. This feature requires a restart after being changed. Internet Set selects sets created in the Internet control panel.

To create a new location, select New Location from the File menu and enter an appropriate name. If the Edit Location panel is not visible, click on the small triangle next to the words Edit Location. Select the check box for each module in the list that is to be controlled by this location. If the setting displayed is correct for the location, press the Apply button, otherwise press Edit to make the changes, then press Apply.

It's best to create configuration sets for each item on your system that you want Location Manager to administer from their individual control panels (eg. TCP/IP) before you start. If any item uses a single configuration only, Location

Manager has no choice in what it uses, so you have nothing to worry about. There is an odd problem you might run into: if, for example, you use a TCP/IP configuration called Home when you are at home and one called Default at the office, Location Manager will not switch to a configuration called Default. To work around this, duplicate the Default configuration and give it a more meaningful name.

Open the TCP/IP control panel and type Command-K, or choose Configurations from the File menu. Select the Default entry in the list of configurations, then click the Duplicate button. Give the copy a meaningful name such as Office, and click OK.

Auto-Open Items and QuickTime Speed can be set within Location Manager by clicking the Edit button. For some settings, a dialog box appears, offering to open the control panel(s) concerned. For the remainder, you must open the relevant control panel, choose a different set and then close the control panel. This inconsistency can be confusing.

If your PowerBook dials in to your ISP via a direct line at home and via PABX line at the office, you might need to create Remote Access configurations for both phone systems. For instance, the PABX system might require you to dial a 0 or 9 to reach an outside line. Use Location Manager to move between these Remote Access configuration sets. Even if you don't change any other settings at the same time, switching with Location Manager is easier than opening Remote Access to make the change.

Location Manager is handy for switching between ISP settings. At the very least, you will need to create Location Manager settings that activate the appropriate TCP/IP (for IP address and domain name options) and Remote Access settings (for

Mac OS shareware

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Z-Write 1.0.1

A text processor for fiction writers.

All these packages can be found on this month's cover CD, along with more detailed reviews.

the phone number). If you use the Internet control panel to specify your email address, news server and so on, create a set for each ISP and use Location Manager to switch between them.

Generally, you do not have to restart the Macintosh after changing locations. If any of the alterations to the settings don't take effect until a restart, Location Manager warns you and provides a handy Restart button.

Once you've created your locations, you can switch between them using the Current Location pop-up menu at the top of Location Manager's main window.

Stephen Withers can be contacted at swithers@ozemail.com.au.



The Location Manager button in the Control Strip module is shown here at the right-hand end.

Revisiting the Simple C++ Standard Template Library. By Michael Smith

Simple C++

At the risk of waxing lyrical yet again about the neatness of the C++ Standard Template Library (STL), this month we introduce the STL map.

Consider the problem of mapping a number to a related string. For example, when processing dates you often want to convert from the format 23/5/2000 to 23 May 2000 and back again. A simple way to do this is to use an array or a vector where each index in the array maps to an appropriate value, for example, `vect[1]="Jan"` and `vect[12]="Dec"`. Listing 1 contains a short program that uses this method.

Listing 1's method works well for certain types of problems, but it has limitations. Mapping the numbers 1 to 12 against appropriate strings is easy enough. However, sometimes the range of numbers is much larger and not contiguous. You also might need to map strings to strings or some other data type, which brings us to the STL map.

A map is an *associative array*, sometimes known as a *dictionary*. Where a vector or list stores a collection of single objects, a map stores a collection of pairs of objects. The first object is sometimes known as a *key* and the second as a *value*. The key must be **unique** (you cannot have two Mondays), but the values don't (several days may have the same temperature). The map is optimised for quick lookup of the key. You can easily ask 'what was the temperature on Thursday?', but it is harder to ask 'when was the temperature 19°C?'.
The syntax is simple: `map<key_type, value_type> var_name;` declares the map. For example, your weather table might be declared as `map<string,int>temp;`. You can then assign the values using array-style syntax: `temp["Monday"] = 18;`

The syntax is simple: `map<key_type, value_type> var_name;` declares the map. For example, your weather table might be declared as `map<string,int>temp;`. You can then assign the values using array-style syntax: `temp["Monday"] = 18;`

Day	Max temperature (°C)
Sunday	21
Monday	18
Tuesday	17
Wednesday	17
Thursday	19
Friday	15
Saturday	17

Maximum temperature readings.

Compiler warnings

If you've been compiling the example files with Microsoft Visual C++ then you might have noticed some strange compiler messages over the last couple of months. Each warning will be several lines long and, unless you're a C++ guru, probably looks like a foreign language.

Why is it so?

When the C++ compiler encounters templates, it expands them and converts them to normal functions. Some of the STL templates are very complex and expand to extraordinarily long expressions. The Visual C++ compiler has a maximum length for an expression, and these template expressions sometimes exceed that maximum. The result is a compiler warning message. The warning is number C4786.

In theory, you can safely ignore the warning, because the Visual C++ compiler still handles this code correctly. In practice, there is a subtle danger. If compiling your

program regularly produces a page or so of harmless warnings then you will quickly get used to ignoring them. One day, one of your programs will have a real error in it which will produce a compiler warning but you'll probably ignore it, along with the others.

A solution is to use the `#pragma` directive, which allows you to specify some compiler-specific parameter. Compilers that do not recognise the parameter will ignore it. Visual C++ 6.0 recognises the following `#pragma` directive:

```
#pragma warning( disable : 4786 )
```

This prevents the display of warning number C4786 (the troublesome one). You can put this directive into your program, at the very beginning and it should compile without that warning.

We also use Inprise C++ Builder 5.0 and GCC 2.8.1 (DJGPP port), but these don't generate that warning.

Listing 2 is a short phone book program. The program begins by declaring two user-defined types: `phonebook` and `pb_iterator`. While this is not necessary, it can make the program more readable. Object declarations using templates can get very long, so using a typedef helps a little.

The `InitPhonebook()` function fills the phonebook with names and phone extensions. This might read a file or query a database in a commercial application, but for simplicity we've just hard coded the names.

The `PhoneList()` function illustrates the use of a map iterator. The iterator points to a pair (ie. a key and value pairing). In the `PhoneList()` function, `i->first` refers to the key and `i->second` refers to the value.

Listing 3 demonstrates an interesting use of a map: to count the occurrences of words in some text input. Each time a string (`str`) is read, you increment the corresponding map entry, `m[str]`. The first time a particular word is read, the instruction `m[str]++` first creates the map

Output from count.exe.

entry with a key of `str` and a value of zero, then increments the value to one. Subsequent occurrences of the word increment the value. Dump the contents of the map, using an iterator, and you have a listing of how often each word occurred in the sentence. The picture above shows a sample output.

Next month, we look at multimaps and sets. Until then, keep on coding.

Michael Smith can be contacted at emmenjay@zip.com.au.

C++ source code

Listing 1: Month.cpp

```
#include <iostream>
#include <vector>
#include <string>
using namespace std;

void Init(vector<string> &m)
{
    m.push_back(""); // 0
    m.push_back("Jan"); // 1
    m.push_back("Feb"); // 2
    m.push_back("Mar"); // 3
    m.push_back("Apr"); // 4
    m.push_back("May"); // 5
    m.push_back("Jun"); // 6
    m.push_back("Jul"); // 7
    m.push_back("Aug"); // 8
    m.push_back("Sep"); // 9
    m.push_back("Oct"); // 10
    m.push_back("Nov"); // 11
    m.push_back("Dev"); // 12
}

int main()
{
    vector<string> months;
    Init( months );

    int i = 7;
    cout << "Month "
         << i
         << " is "
         << months[i]
         << '\n';
    return 0;
}
```

Listing 2: Map.cpp

```
#include <iostream>
#include <map>
#include <string>
using namespace std;

typedef map<string, int>
    phonebook;
typedef map<string, int>::
    const_iterator pb_iterator;

void InitPhonebook(
    phonebook &pb )
{
    pb["Angus"] = 172;
    pb["Nathan"] = 175;
    pb["Vanessa"] = 126;
    pb["Josh"] = 160;
    pb["Alex"] = 116;
    pb["Andrew"] = 152;
}
```

```
void PhoneList(
    phonebook &pb )
{
    pb_iterator i;
    for (i=pb.begin();
        i!=pb.end();
        i++)
        cout << i->first
              << '\t'
              << i->second
              << '\n';
}

int main()
{
    // Phone Book
    phonebook pb;

    InitPhonebook( pb );
    PhoneList( pb );

    return 0;
}
```

Listing 3: Count.cpp

```
#include <iostream>
#include <map>
#include <string>
using namespace std;

int main()
{
    string str;
    map<string, int> m;
    map<string, int>::
        iterator i;

    while (!cin.eof()) {
        cin > str;
        m[str]++;
    }
    cout << "\n\n";
    for (i=m.begin();
        i!=m.end();
        i++)
        cout << i->first
              << '\t'
              << i->second
              << '\n';

    return 0;
}
```

These listings can be found
on this month's cover CD.

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Java

Last month, you loaded and displayed an image in a Java applet. This month, go a step further by learning how to play sounds as well.

Actually, playing a sound file is not difficult. Java provides a `java.applet.AudioClip` class which does all the work for you. The class has three functions: `play()`, `loop()` and `stop()`.

As with all classes, you must make an instance of the `AudioClip` class before you can use it in your programs. If you like, you can make multiple `AudioClip` objects and play them simultaneously. The resulting sound is mixed together to produce a composite, but this doesn't necessarily mean it will be harmonious — that will depend on your individual sounds.

Last month, you used the Applet's `getImage()` method to load an image object into memory. Similarly, you use a method called `getAudioClip()` provided by the Applet class to load your sound clip into memory.

Listing 1 shows how you can extend the program you wrote last month to include a sound clip.

First, declare a variable of type `AudioClip`. To allow the user to pass in the name of the audio file as a parameter, you must test to see if the parameter has been supplied (just as you do with an image). If it has been, you can load the file.

Finally, you play your sound when the user clicks a mouse button. This also fires off a screen repaint, which draws the image at the point where the mouse was clicked.

Sounds play asynchronously (that is, the program keeps running while the sound is playing, without having to wait for it to finish). In this way, it appears that the sound playing and the picture being drawn are occurring at the same time.

You will notice that you call the audio object's `stop()` and `play()` methods. Use `play()` to play the sound that has been loaded. The `stop()` beforehand is just a

safeguard in case the sound is still playing at the time the program goes into the event handler again. This can happen easily if the sound clip is long, or if the user clicks the button rapidly more than once.

OK, that was painless. You can now add a soundtrack to play in the background of your applet.

Multiple `AudioClip` objects can play at the same time, so you need to make another `AudioClip` object which loads

indeed play over and over again, even when you leave the Web page with your applet!

To test this, open up a few new Web browser windows (using Ctrl-N, or New Browser Window from the File menu). Now, open the HTML file in listing 4, which loads your Java class. Your soundtrack plays and the applet works as expected. Next, tell your browser to load another browser window, for example, <http://apcmag.com/>. The applet is no

longer running, but the jingle is still playing. Even if you kill that browser window, the music continues to play. You have to close every browser window before the tune stops.

This is really the only problem to be aware of with the `AudioClip` object. You need to make sure that you tell the looping sound to stop (by a call to the `stop()` method) when your applet closes.

Fortunately, this is very easy (see listing 5). The Applet class, from which all applets inherit, provides another method called `stop()`, just as it provides `init()` and `paint()` which you have been using for the last few months. This method is called whenever the applet should close down, such as when the user

has moved to a new page or the Web browser is being closed. In your applet `stop()` method, just call the `stop()` method of the soundtrack `AudioClip` object.

Your chosen sound file may prove to be grating to your Web site visitors, so it might be an idea to provide a button that toggles your music on and off. This is implemented in listing 7, by adding a button and using a Boolean variable to specify whether the soundtrack is playing or not. If it is playing, then you stop it; if it is not, then you start it looping again.

That's just about all there is to know about adding sound to your applets. Next month's column looks at manipulating Web fonts with Java.

David Williams can be contacted at dave@qed.newcastle.edu.au.



your soundtrack. It can start playing right in the applet's `init()` method because it need not be fired by a specific event like a mouseclick. It can play from the time the applet is loaded.

To play your soundtrack continually, play it with the `AudioClip`'s `loop()` method. As you might expect, `loop()` plays the sound over and over again. See this in listing 3.

If you run this applet — either by typing it in and compiling, or by running it from the APC cover CD, which also contains some sample sound files — you will hear a familiar jingle playing in your applet. At the same time, you can click the mouse all over the window and watch as your picture is redrawn and the first sound effect plays.

However, there's an unexpected catch with the `loop()` method. The sound will

Java source code

Listing 1

```
import java.applet.*;
import java.awt.*;
import java.awt.event.*;
import java.net.*;

public class list1 extends
Applet
    implements MouseListener
{
    private int drawX, drawY;
    String msg1;
    String msg2;
    String imgnam = null;
    String sndnam = null;
    Image img;
    AudioClip audio;
    boolean doimg = false;

    public void init ()
    {
        String who;
        String where;
        URL uwhere;

        who = getParameter ("who");
        if (who == null)
            who = "world";

        uwhere = getDocumentBase ();
        imgnam = getParameter
        ("image");
        if (imgnam != null)
            img = getImage (uwhere,
            imgnam);

        where = uwhere.toString ();
        msg1 = "Hello, " + who +
        ",";
        msg2 = "from " + where;

        sndnam = getParameter
        ("audio");
        if (sndnam != null)
            audio = getAudioClip
            (uwhere, sndnam);

        addMouseListener (this);
    }

    public void processMouseEvent
    (MouseEvent e)
    {
        if (e.getID () ==
        MouseEvent.MOUSE_PRESSED)
        {
            if (sndnam != null)
            {
                audio.stop ();
                audio.play ();
            }

            doimg = true;
            drawX = e.getX ();
            drawY = e.getY ();
            repaint ();
        }
    }

    public void mouseReleased
```

```
(MouseEvent e) {}
    public void mousePressed
    (MouseEvent e) {}
    public void mouseClicked
    (MouseEvent e) {}
    public void mouseEntered
    (MouseEvent e) {}
    public void mouseExited
    (MouseEvent e) {}

    public void paint (Graphics g)
    {
        Dimension d = getSize ();

        g.drawRect (0, 0, d.width -
        1, d.height - 1);
        g.setColor (Color.blue);
        g.drawString (msg1, 10, 15);
        g.drawString (msg2, 10, 30);
        g.drawString ("Click
        anywhere to see mouse event
        handling", 10, 45);

        if ((doimg == true) &&
        (imgnam != null))
        {
            g.drawImage (img, drawX,
            drawY, this);
            g.setColor (Color.red);
            g.drawString ("Squeak!",
            drawX, drawY + 10 +
            img.getHeight (this));
        }
    }
}
```

Listing 2

```
<html><head>
<title>Hello world</title>
</head><body>
<applet code="list1.class"
width="400" height="400">
    <param name="who" value="APC
    reader!">
    <param name="image"
    value="lilgirls.gif">
    <param name="audio"
    value="HiThere.au">
</applet>
</body></html>
```

Listing 3

```
public class list3 extends
Applet
    implements MouseListener
{
    ...
    AudioClip audio, soundtrack;

    public void init ()
    {
        ...
        soundtrack = getAudioClip
        (uwhere, "CocaCola.au");
        soundtrack.loop ();
    }
}
```

Listing 4

```
<applet code="list3.class"
width="400"
height="400">
```

Listing 5

```
public class list5 extends
Applet
    implements MouseListener
{
    ...
```

```
    public void stop ()
    {
        soundtrack.stop ();
    }
}
```

Listing 6

```
<applet code="list5.class"
width="400"
height="400">
```

Listing 7

```
public class list7 extends
Applet
    implements MouseListener,
    ActionListener
{
    ...

    boolean soundtrackon = true;
    Button toggleBtn;

    public void init ()
    {
        ...

        toggleBtn = new Button
        ("Toggle soundtrack");
        toggleBtn.addActionListener
        (this);
        add (toggleBtn);
    }

    public void stop ()
    {
        if (soundtrackon)
            soundtrack.stop ();
    }

    public void actionPerformed
    (ActionEvent event)
    {
        if (soundtrackon) {
            soundtrack.stop ();
            soundtrackon = false;
        } else {
            soundtrack.loop ();
            soundtrackon = true;
        }
    }
}
```

Listing 8

```
<applet code="list7.class"
width="400"
height="400">
```

These listings can be found
on this month's cover CD.

Restrict access to pages in your site by password protecting them using ASP. By Daniel Potts

Insite

If you have a Web site and would like to restrict access to information on it, one approach is to create Web pages with randomised names like 'jqihy28dh26.html' and only give out the URL to people you want to access that page. The problem with this is that you can't link to the page (because it would no longer be secret) and the URL is not easy for your site users to remember. Additionally, anyone who has access to one of your trusted users' computers could retrieve your secret URL from their Web browser history lists.

Another approach is to use JavaScript to password protect pages, but this is not very browser friendly and can be hacked much more easily than server-side password protection.

The server-side password protection demonstrated here uses Active Server Pages (ASP). By using just a few lines of code, you can restrict access to a single page or to a whole site. ASP is a Microsoft technology and will only run on servers that support it (such as IIS and Personal Web Server), so check with your ISP before trying this example.

Step 1: Create a login page

If you only want to protect one page on your site, you could have the login on the same page as your restricted information. Here, we split the functions between two pages, as this is slightly more flexible and considerably less complicated.

In this case, the login page performs two functions. First, it provides a form, containing fields called 'userID' and 'password', which prompts the user to log in. Second, it processes the HTML form and determines whether the userid and password submitted are correct.

To perform both these functions, the HTML form must use itself as the 'action' parameter. My login page is called index.asp, so the form on it has index.asp as its action. This is shown in listing 1.

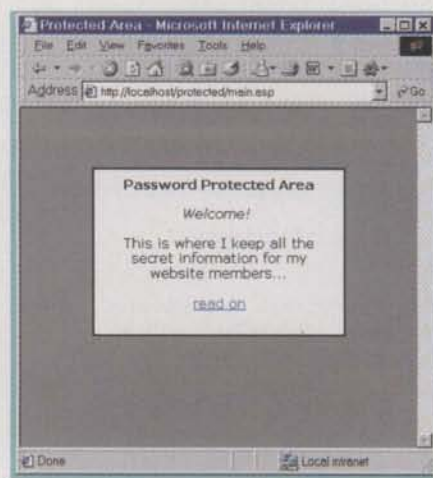
To check a form's values when it is submitted, place a short ASP script at the top of the page. ASP script is designated by <% and %> tags, which are processed by the server prior to being sent to the browser (see Insite, APC July, page 128). When a



The login page

form is submitted to an ASP page, the form's variables are contained in a collection called request.form(). All you need to do is check that request.form("userID") and request.form("password") contain the right text strings. In this example these are admin and letmein, respectively.

If the userid and password supplied do not match your predetermined values, execute the rest of the page, which contains your HTML login form. If the login is correct, you redirect your users to the main protected area page — in this case main.asp. You need to provide a way of checking that your user logged in successfully before redirecting them to main.asp.



A password-protected page

Glossary

A **collection** is a group of related objects. The position of objects in the collection is not indexed as in an array, instead each object needs to be requested by name. Two collections are used in the example: request.form() and request.cookies().

Sessions, and in particular **session variables**, can be used to track users and store information about them on the server. When someone first arrives at any ASP page on your site, they are assigned a session ID by the server, and a new user session begins. A session ends when the user closes their browser or after a period of inactivity, usually 20 minutes. Sessions are tracked by the server using a single cookie.

A **cookie** is a small amount of text written to the browser to allow user information to be made available from page to page without having to pass it in the query string (ie. the URL). By default, a cookie expires when the browser is closed and information is never written to the hard drive of the user's computer. Explicitly setting an expiry date will override this default. It is possible to make a cookie secure, and to restrict it to the site that created it, but it is poor practice to store sensitive information in a cookie.

This is done in one line of code by setting a cookie. In this case the cookie is called logged_in and assigned the value 1. The cookie does not contain any login information such as userid or password, so if it is somehow intercepted, it won't compromise your site's security. If you want to be doubly sure of securing your cookie you can add the .Secure and .Domain attributes to prevent other sites from being able to read it. See listing 2.



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Listing 1: Creating the HTML login page

```
<form action="index.asp" method="post">
<table>
<tr>
<td align="right">User ID</td>
<td><input type="text" name="userID"></td>
</tr>
<tr>
<td align="right">Password</td>
<td><input type="password" name="password"></td>
</tr>
<tr>
<td></td>
<td><input type="submit" value=" Login "></td>
</tr>
</table>
</form>
```

Listing 2: Checking login information and setting a cookie

```
%
if request.form("userid") = "admin" and _
request.form("password") = "letmein" then
    response.cookies("logged_in") = 1
    response.cookies("logged_in").Domain = _
    "www.mysite.com.au"
    response.cookies("logged_in").Secure = TRUE

    response.redirect("main.asp")
end if
%>
```

Listing 3: Verifying that your users have logged in with a cookie request

```
<%
if request.cookies("logged_in") <> "1" then
    response.redirect("index.asp")
end if
%>
```

Listing 4: Giving each of your visitors unique usernames and passwords

```
<%
if request.form("userid") = "admin" and _
request.form("password") = "letmein" then
    response.cookies("logged_in") = 1
    response.redirect("main.asp")

elseif request.form("userid") = "sarah" and _
request.form("password") = "secret" then
    response.cookies("logged_in") = 1
    response.redirect("main.asp")

elseif request.form("userid") = "george" and _
request.form("password") = "camel" then
    response.cookies("logged_in") = 1
    response.redirect("main.asp")
end if
%>
```

These listings can be found
on this month's cover CD.

Make sure that this code is placed right at the top of the page, because you can't use a `response.redirect()` after you've written any HTML to the browser.

Step 2: Protect your pages

Once a user has been redirected to `main.asp`, or tries to access another page in the protected area of the site, you need to confirm that they entered via the login process (hackers may attempt to by-pass the login process by typing the full URL path to `main.asp` in their browser's address field).

Again, this is done by requesting the cookie called `logged_in`. If the cookie is set to 1, then you know it's safe to execute the rest of the page(s). If it doesn't exist or is set to some other value, you need to redirect the user back to the login page. The cookie will 'self-destruct' when the browser session ends. This is usually after 20 minutes of inactivity or when the browser is closed down, at which point the user will need to log in again.

The code required to protect ASP pages on your site is given in listing 3.

You can only use ASP script on a page with an ASP file extension. It doesn't work on a .html or .htm page, because the server cannot process an HTML page prior to sending it to the browser. Instead, all your ASP source code will be sent to the browser — so be careful. You also need to make sure that this code is at the very top of any page you want to protect (ie. before any HTML tags).

Step 3: Add more logins

If you want to give each of your Web site's users their own unique username and password set, you can add an 'ElseIf . . . Then' statement on your login page for each of them, as shown in listing 4.

Further suggestions

The next logical step with password protection is to build a database with an administration page so that you can cre-

ate new logins and modify existing ones without having to embed login information in your code. The added benefit is that no login information is hard coded in your Web pages.

You can also create multiple levels of security, where people can view some pages and not others. To do this, assign your `logged_in` cookie to different values and test for the right one before displaying any given page.

Alternatively, you could provide personalised messages or information for your users by assigning a number to each one. Then, by modifying the code in listing 3 to include an 'Elseif . . . Then' statement for each number, you could use `response.write()` commands to return personalised information.

Next month Insite will look at using a Microsoft Access database to create a user mailing list for your site.

Daniel Potts can be contacted at
daniel@indigointeractive.com.au.

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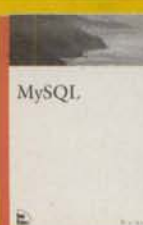
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1 YEAR WARRANTY ON PARTS AND LABOUR

2.2
KG

\$3799

intel
inside

celeron™

466
MHZ

CD
ROM

HIGHLANDER
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HL-43C/46

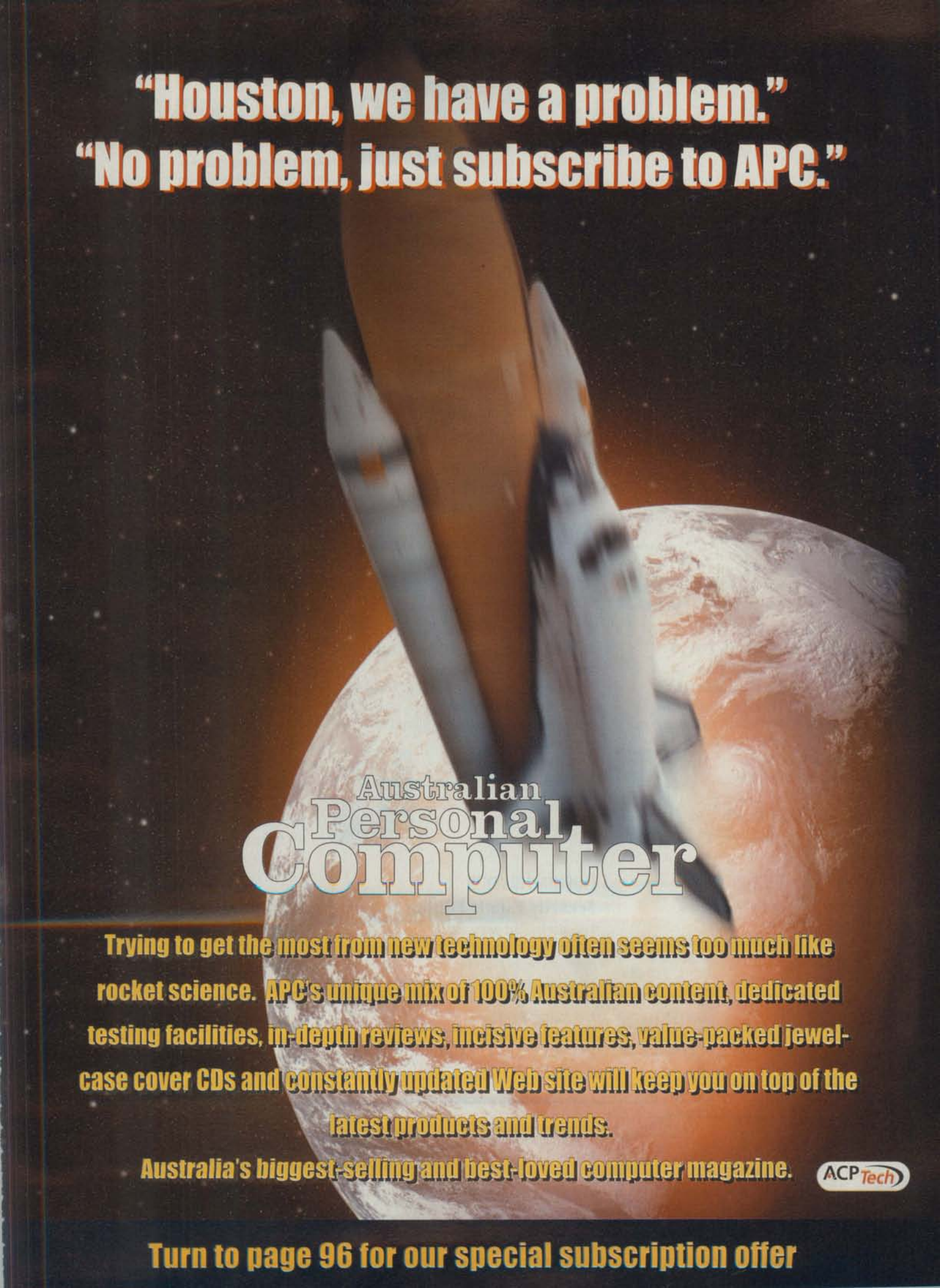
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Code	OEM Equivalent	Compatible With:	Price
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CC-2BK	BJI-201BK	BJC-600/610/620 Black	\$6.00
CC-3BK	BJI-643BK	BJC-800/820 Black	\$12.00
CC-4BK	BCI-21	BJC-2000/4000/5000 Series Black	\$7.00
CC-5CL	BCI-21C	BJC-2000/4000/5000 Series 3-Colour	\$12.00
CC-6BKHC	BJI-201BK HC	BJC-600/610/620 Hi-Cap Black (14ML)	\$9.00
CC-7BK	BCI-10	BJ-30 Black	\$9.00
CC-8BK	BCI-11	BJC-70 Black	\$9.00
CC-9CL	BCI-11C	BJC-70 3-Colour	\$17.00
CC-11CL	BCI-61	BJC-7000 Series 3-Colour	\$32.00
CC-12PCL	BCI-62 PHOTO	BJC-7000 Series Photo 6-Colour	\$38.00
CC-13B	BCI-3	BJC-6000 Black	\$25.00
CC-14C	BCI-3C	BJC-6000 Cyan	\$16.00
CC-15M	BCI-3M	BJC-6000 Magenta	\$16.00
CC-16Y	BCI-3Y	BJC-6000 Yellow	\$16.00
CC-17PBK	BCI-3PBK	BJC-6000 Photo Black	\$18.00
CC-18PC	BCI-3PC	BJC-6000 Photo Cyan	\$18.00
CC-19PM	BCI-3PM	BJC-6000 Photo Magenta	\$18.00

EPSON COMPATIBLE

Code	OEM Equivalent	Compatible With:	Price
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CE-52BK	SO20034	STYLUS Colour/Colour Pro Black	\$20.00
CE-53CL	SO20028	STYLUS Colour/Colour Pro 3-Colour	\$30.00
CE-54BK	SO20047	STYLUS 200/820/Colour II /Its Black	\$13.00
CE-55CL	SO20049	STYLUS 200/820/Colour II /Its 3-Colour	\$21.00
CE-56PBK	SO20093	STYLUS Colour 400/500/600/Photo Black	\$17.00
CE-57CL	SO20097	STYLUS Colour 200/500 3-Colour	\$23.00
CE-58BK	SO20108	STYLUS Colour 800/850/1520 Black	\$17.00
CE-59CL	SO20089	STYLUS Colour 400/600/800/1520 3-Colour	\$23.00
CE-60PCL	SO20110	STYLUS Colour 700/Photo/Photo 700 5-Colour	\$26.00
CE-61BKCL	SO20138	STYLUS Colour 300 4-Colour	\$31.00
CE-65BK	SO20187	STYLUS Colour 440/640/660 Black	\$16.00
CE-66BK	SO20189	STYLUS Colour 740/760 Black	\$16.00
CE-67CL	SO20191	STYLUS Colour 440/640/660/740/760 3-Colour	\$26.00
CE-68PCL	SO20193	STYLUS Photo 750 5-Colour	\$33.00



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A3CP	A3 90gsm Coated Paper	100	\$ 26.00	0.26
A4HRP	A4 90gsm Hi-Res Paper	100	\$ 15.00	0.15
A3HRP	A3 90gsm Hi-Res Paper	100	\$ 30.00	0.30
A4WF	A4 White Film 100mu	50	\$ 47.00	0.94
A3WF	A3 White Film 100mu	50	\$ 90.00	1.80
A4CF	A4 Clear Film 100mu	50	\$ 39.00	0.78
A3CF	A3 Clear Film 100mu	50	\$ 71.00	1.42
A4FGP	A4 Full Gloss Photo Paper	50	\$ 44.00	0.88
A3FGP	A3 Full Gloss Photo Paper	50	\$ 79.00	1.58
A4PH	A4 Economy Photo Paper	50	\$ 23.00	0.46
AC2	Artists Canvas	25	\$ 60.00	2.40
GC4F	Greeting Card (4 Fold)	100	\$ 28.00	0.28
GCBF	Greeting Card (Bi-Fold)	100	\$ 48.00	0.48
DCCS	Double Coated Card Stock	50	\$ 24.00	0.48
GCS	Glossy Card Stock	50	\$ 24.00	0.48
TTP	T-Shirt Transfer Paper	25	\$ 35.00	1.40
CTP2	Ceramic Transfer Paper	25	\$ 80.00	3.20
MP	Magnetic Paper	25	\$ 58.00	2.32
BC1	Business Cards (10 per A4)	20	\$ 19.00	0.95

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CANON BJ-300/330
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20
CANON BJC-3000/6000/6500
HP Desk Jet 400/500 Series
HP Desk Jet 600/660/690 Series
HP Desk Jet 700/850C/855C/870C/890C/1000C Series
HP Deskjet 300 Series & Olivetti JP's!
EPSON Stylus 400/800/800+/1000
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/Is
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/640/660/700/740/760/900
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IBM/LEXMARK 5000/5700/7000 & Z Series
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!

No. of Refills

60
9
7
16
45
9
6
6
6
8
8
8
12
12
12
6
6
12
Kit Code
21-BKL
3-BKL
4-BKL
5-BKL
19-BKL
18-BKL
46-BKL
8A-BKL
8B-BKL
29-BKL
7-BKL
1-BKL
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33A-BKL
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CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-3000/6000/6500
HP Colour Desk Jet 300/400/500 Series & Olivetti!
HP Colour Desk Jet 600C/660C/690C Series
HP Desk Jet 850C/855C/870C/1000C Series
HP Desk Jet 710/720/890 Series
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/Is
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
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No. of Refills

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3x12
3x8
3x30
3x4
3x12
3x12
3x3
3x3
3x4
3x12
3x12
3x12
3x12
3x6
3x6
12/Colour
Kit Code
22-CLR
25-CLR
10-CLR
17-CLR
47-CLR
14A-CLR
14B-CLR
30A-CLR
30B-CLR
16-CLR
24-CLR
34A-CLR
34B-CLR
36A-CLR
36B-CLR
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Intel Pentium III 866	\$1,279
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AMD Athlon K7- 750 3D	\$423
AMD Athlon K7- 800 3D	\$539
AMD Athlon K7- 850 3D	\$719
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ASUS P3V4X, VIA, U-66 133	15.0Gb WD Caviar U-66 2M 7200	16M Voodoo 3 2000 143MHz PCI / AGP	Hitachi CM615 17", 24 1280x1024
Epox 7KXA, VIA, U-66 (Slot A) 133	20 Gb Fujitsu U-66	16M Millennium G400 Dual Head (oem)	Mitsubishi DView 19NF 19", FLATTRON\$1,104
ASUS K7VA, VIA, KX, U66, Audio	20Gb Seagate Barracuda 2M 7200	32M Leadtek Winfast GeForce oem	Hitachi CM715 19", 22 1600x1200
SuperMicro PIII DM3, 840 (Dual, U3W SCSI)	30Gb WD Caviar U-66	32M Creative Blaster GeForce II	Keycorp 15.1" TFT Monitor

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Abit BP6, BX, U/66 (370 dual)	\$257
Aopen AX64 PRO, VIA133A	\$214
ASUS P3V, VIA, U-66	\$178
ASUS P3C-D, 820, U-66 (Dual) 133	\$851
ASUS P2BDS, BX (Dual, U2W SCSI)	\$952
Epox 58MPV3C2, VIA, U-66 (s-7) AT	\$145
Epox 51MPV3G2, VIA, U-66, 1M (s-7)	\$165
Epox KPB6S, BX (Dual)	\$244
FIC VA-503+, 1Mb (s-7) AT	\$152
FIC KA11, VIA, U/66 (audio) 133	\$211
FIC SD11, VIA686, U/66 (Slot A)	\$224
Gigabyte 5AA/AX, ALI, 512K (s-7) AT / ATX	\$145
Gigabyte 6VX7-4X VIA (4X AGP)	\$198
Gigabyte 686BX, BX (Dual)	\$284
Gigabyte GA-71X, U/66 (Slot A)	\$319
SuperMicro P6DBE, BX (Dual)	\$408
SuperMicro PIIIDME, (Dual ide) n/a	\$733

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45Gb 75 GXP IBM Deskstar U-66 2M 7200	\$620
10Gb Quantum FB LM U-66 7200	\$252
15Gb Quantum FB LM U-66 7200	\$300
20.5Gb Quantum FB LM U-66 7200	\$361
30Gb Quantum FB LM U-66 7200	\$555
10Gb WD Caviar U-66	\$177
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Fujitsu 9.1 GB U160 10000	\$667
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Fujitsu 36.2 GB U160 10000	\$1,728
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36.4Gb Quantum Atlas V U160 LVD68	\$1,460
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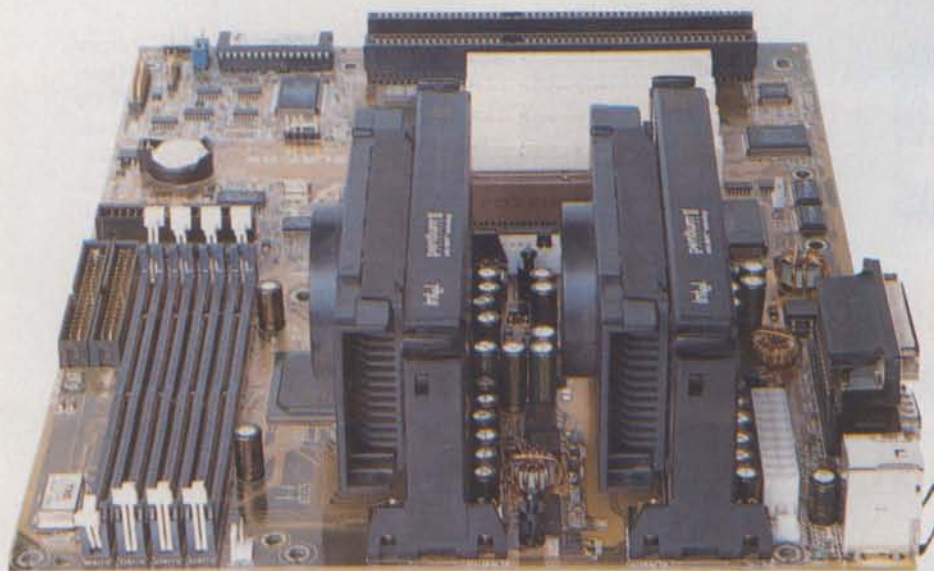
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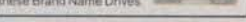
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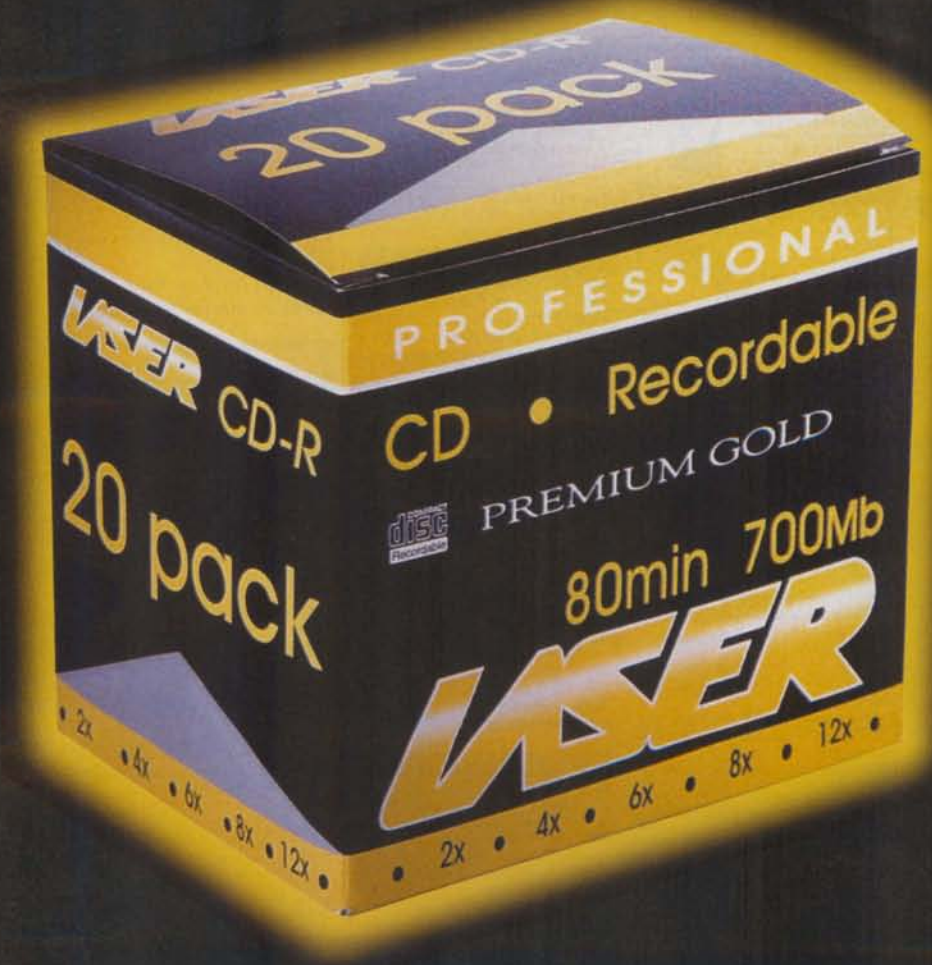
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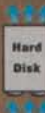
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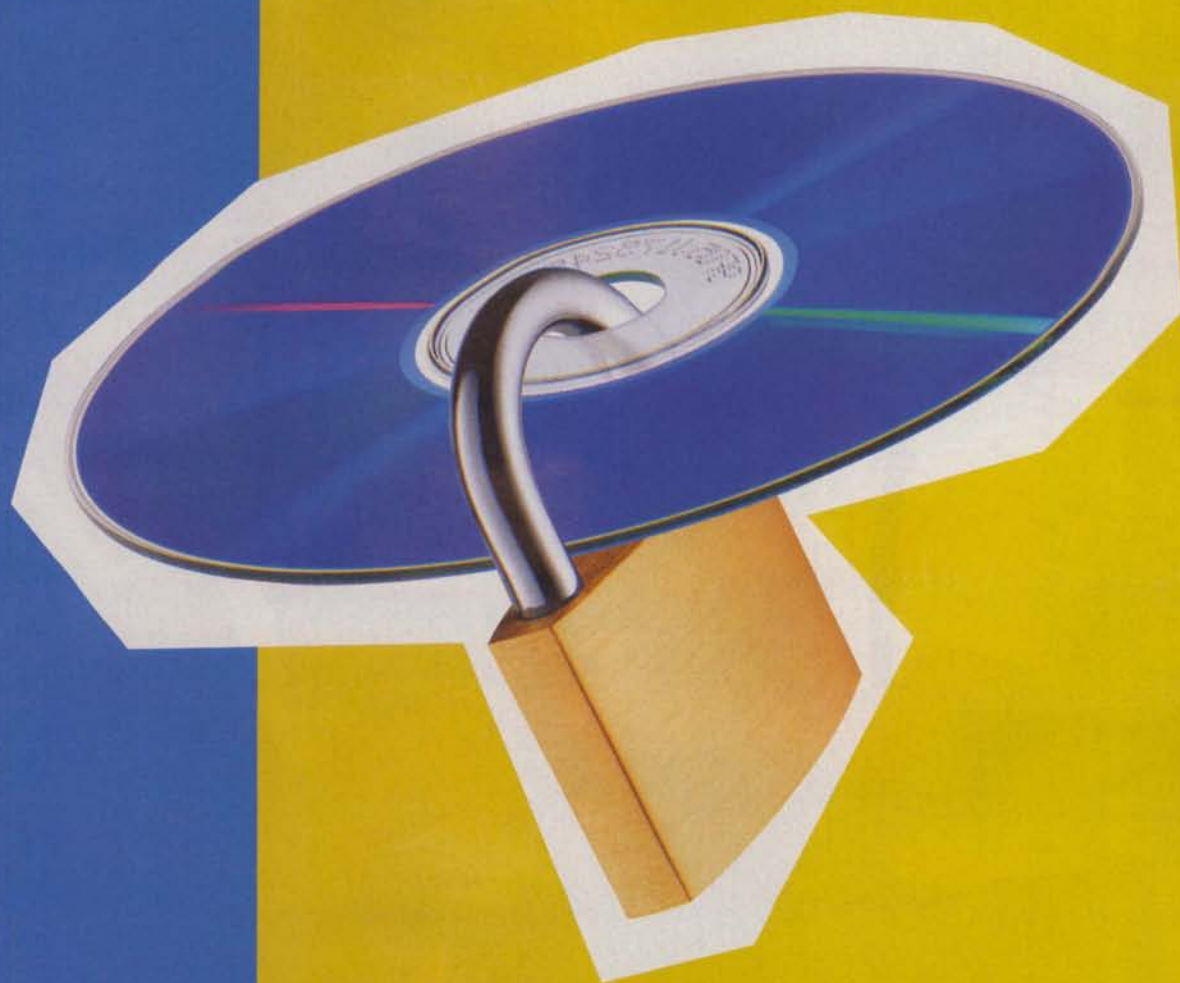
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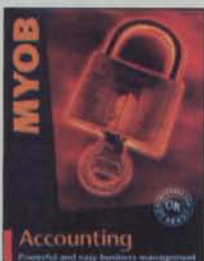
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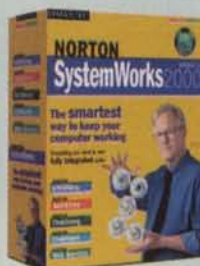


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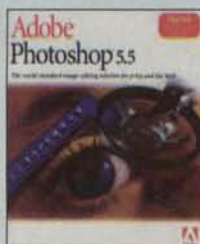
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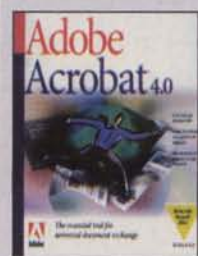
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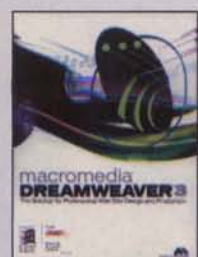
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CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
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No. of Refills

60
9
7
16
45
9
6
6
6
8
8
12
12
12
6
6
12

Kit Code

21-BKL
3-BKL
4-BKL
5-BKL
19-BKL
18-BKL
46-BKL
8A-BKL
8B-BKL
29-BKL
7-BKL
1-BKL
2-BKL
33A-BKL
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HP Colour Desk Jet 300/400/500 Series & Olivetti
HP Colour Desk Jet 600C/660C/690C Series
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No. of Refills

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3x12
3x8
3x30
3x4
3x12
3x12
3x3
3x3
3x4
3x12
3x12
3x12
3x6
3x6
12/Colour

Kit Code

22-CLR
25-CLR
10-CLR
17-CLR
47-CLR
14A-CLR
14B-CLR
30A-CLR
30B-CLR
16-CLR
24-CLR
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Canon BJ-30, BJC-70, BJC-80
Canon BC-01, BC-02, BJC-210
Canon BC-03, BC-3X (fax) BJC-210sp, 245, 255, 265
Canon BC-06 photo
Canon BJ-300, 330
Canon BJC-600, 610, 620
Canon BJC-800, 820, 880
Canon BJC-2000 BC-20, BCI-21, BCI-21C
Canon BJC-4000, 4100, 4200, 4300, 4550, 5000, 5500 BCI-21
Canon BJC-4000, 4100, 4200, 4300, 4550, 5000, 5500 BC-20
Canon BJC-5000/5500 (BC-23 only)
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K2BK	6/9	K10CLR	12
K3BK	6	K22CLR	6
K3BK	6	K11CLR	6
K1BK	6/9	K9CLR	12
		K25CLR	6
K7BK	60	K1CLR	30
K6BK	7	K2CLR	12
K4BK	9	K2CLR	12
		K23CLR	6
K9BK	7		
K10BK	16	K3CLR	8
K11BK	12	K4CLR	4
K12BK	9/60	K5CLR	30
K12BK	60	K5CLR	30
K12BK	9	K5CLR	30
K27BK	9	K5CLR	30
K28BK	12	K35CLR	6
		K36CLR	6
K19BK	2	K24CLR	6
		K15CLR	6
K13BK	12	K20CLR	6/12
K16BK	12	K7CLR	6/12
K14BK	12	K6CLR	12
K15BK	8	K6CLR	6
K17BK	12	K20CLR	6/12
K17BK	12	K8CLR	6
K17BK	12	K17CLR	6/12
K21BK	3	K34CLR	3
K26BK	12	K16CLR	6/12
K6BK	12	K16CLR	6/12
K6BK	12	K35CLR	6
		K33CLR	9/12
K18BK	6	K13CLR	12
K24BK	6	K13CLR	12
		K29CLR	12
K25BK	6	K30CLR	12
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24120-8	Photo Glossy White Film (100 UM)	A4	20	\$22.90
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Canon/Apple BJC-4000/5500	BCI-218	15	0788
Canon/Apple BJC-4000/5500	BC-20	3	0488
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HP Deskjet 600 Series	51629A	2	1488
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Epson Stylus 400/800/1000 (1st rel.)	S020025	6	2388
Epson Stylus Colour/Pro/XL	S020034/62	4/2	2288
Epson Stylus Colour 820/11/11s	S020047	4	2088
Epson Colour 400/500/600	S020093	6	1888
Epson Colour 800/1520	S020108	4	1888
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Canon BJC-7000	BCI-61	3x4	51XX
HP Deskjet 400/500 Series	51625A	3x10	15XX
HP Deskjet 600 Series	51649A	3x10	13XX
HP Deskjet 800 Series/1600c	51641A	3x6	11XX
Epson Stylus 200/500	S020097	3x10	19XX
Epson Stylus Colour/Pro/XL	S020036/66	3x8/2	21XX
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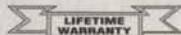
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CANON BJC600/610/620	15	C5
CANON BJC4000/4100/4200/4550 BCI-21/20	50/8	C8
CANON BJC 6000	4	C19
CANON BJC 7000	12	C15
HP DESKJET 400, 500 & 600 SERIES	7	H2/H4
HP DESKJET 820C/850C/855C/870C/1000C	6	H6
HP DESKJET 720/890/Officejet 1150	6	H13
HP DESKJET 1200 B, Y, C, M	6	H8
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EPSON STYLUS COLOUR 400/800/1000	8	E1
EPSON STYLUS COLOUR / PRO / XL	6	E2
EPSON STYLUS 820 / COLOUR 11/11S/200	12	E4
EPSON COLOUR 400/500/600/700/Photo Ex	12	E7
EPSON COLOUR 440/640/740/800/850/1520	12	E7
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CANON BJC 7000	6	C16
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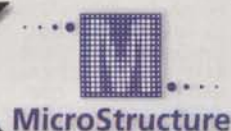
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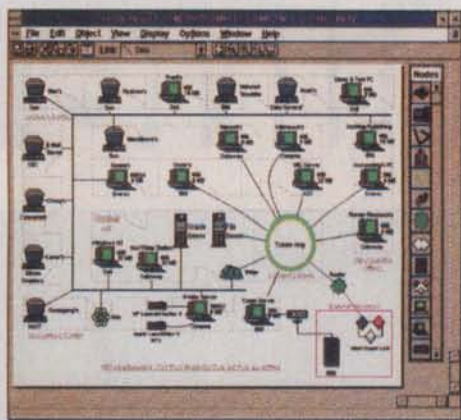


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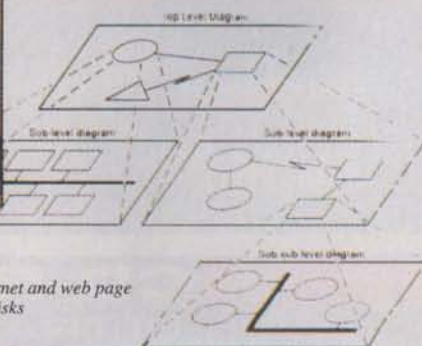
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	Satellite Pro 4310XCDT	Satellite Pro 4320XDVD	Satellite Pro 4360XDVD	Satellite Pro 4380XDVD
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 750MHzSS*	Pentium III 750MHzSS*
RAM Std/Max	64/320 MB	64/320 MB	64/320 MB	64/320 MB
Hard Disk	6GB	12GB	12GB	12GB
Screen	13.3" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24xCD-ROM	No	No	No
Mic & Spkr	Yes	Yes	Yes	Yes
Port replicator	Optional	Optional	Optional	Optional
Video Ram	8Mb	8Mb	8Mb	8Mb
DVD capable	No	Inc 6xDVD	Inc 6xDVD	Inc 6xDVD
Weight	3.17 kg	3.17 kg	3.17 kg	3.17 kg
Warranty	1 Year	1 Year	1 Year	1 Year
56K V.90 modem	Yes	Yes	Yes	Yes
GST Ex + GST	\$Call + \$Call	\$5,078 + \$507.80	\$Call + \$Call	\$Call + \$Call

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Tecra 8100

DVD

- Intel Celeron 600MHz
- 14.1" TFT
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- 6 x DVD
- 3 Year Warranty

Styled for constant mobile performance, the Tecra 8100 series provides you with the ultimate combination of traditional Tecra investment benefits, high processor performance and a new sleek look and feel.

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NEW MODEL

*SS = Speed Step



Compare Tecra Models

	Tecra 8100	Tecra 8100	Tecra 8100	Tecra 8100
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 700MHzSS*	Pentium III 750MHzSS*
RAM Std/Max	64 MB	64 MB	128 MB	128 MB
Hard Disk	6GB	12GB	12GB	20GB
Screen	14.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24x CD-ROM	24x CD-ROM	24x CD-ROM	24x CD-ROM
Mic & Spkr	Speakers	Speakers	Speakers	Speakers
Port replicator	Optional	Optional	Optional	Optional
Select bay	Yes	Yes	Yes	Yes
DVD capable	6 x DVD	6 x DVD	6 x DVD	6 x DVD
Weight	2.8 kg	2.8 kg	2.8 kg	2.8 kg
Warranty	3 Years	3 Years	3 Years	3 Years
56K V.90 modem	Yes	Yes	Yes	Yes
GST Ex + GST	\$Call + \$Call	\$6,388 + \$638.80	\$Call + \$Call	\$Call + \$Call



Pentium® III
available in
some Tecra's

NEW MODELS

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	Portégé 3440CT	Portégé 7200CTe
Processor	Pentium III 500MHz SS*	Pentium III 650MHz
RAM Std/Max	64/192 MB	64/192 MB
Hard Disk	6GB	12GB
Screen	11.3" TFT	13.3" TFT
Display	1024x768	1024x768
CD-ROM	Optional	Optional
Mic & Spkr	Yes	Yes
Port replicator	Multi-media	No
Select bay	Optional	No
DVD capable	Yes	Yes
Weight	1.6 kg	2 kg
Warranty	3 Years	3 Years
56K V.90 modem	Yes	Yes
GST Ex + GST	\$4,102 + \$410.20	\$Ca" + \$Ca"

Portégé 3440CT

Portege 3440CT offers Intel®'s powerful Mobile Pentium® III 500MHz processor with Intel SpeedStep™ technology to speed through applications. At 25mm thin and only 1.6kg, Portege 3440CT packs unprecedented power into its slender charcoal grey and silver magnesium alloy case.



*SS = Speed Step

Toshiba Install Options

For a small extra charge we can install your chosen options into your new Toshiba: a modem, more information.

*Rental Figures quoted are for business use, includes stamp duty and FID for NSW, to approved purchases. Rental price quoted include GST

Options for Toshiba Notebooks

For more options see
Web Direct Link

TOSHIBA EDO Memory Upgrades

32MB for Tecra 8000 (not for PIII models)/ Portégé7000/Satellite 4000	
GST Ex \$186 + GST \$18.60 (29356)	GST INC \$204.60
32MB for Portégé 3110	
GST Ex \$174 + GST \$17.40 (81078)	GST INC \$191.40
64MB for Tecra 8000 (not for PIII models)/ Portege7000/Satellite4000	
GST Ex \$346 + GST \$34.60 (29348)	GST INC \$380.60
64MB for Portégé 3020	
GST Ex \$362 + GST \$36.20 (77229)	GST INC \$398.20

TOSHIBA Battery Packs

For Satellite 4000/4010/2520CDT & others	
GST Ex \$108 + GST \$10.80 (21930)	GST INC \$118.80
For Portégé 3010/3020 (Lithium Ion)	
GST Ex \$124 + GST \$12.40 (73665)	GST INC \$136.40
For Satellite 4000 Series	
GST Ex \$108 + GST \$10.80 (72109)	GST INC \$118.80
For Tecra 8000 (Lithium Ion)	
GST Ex \$235 + GST \$23.50 (29358)	GST INC \$258.50

TOSHIBA High Capacity Battery Packs

For Portégé 3010/3020	
GST Ex \$235 + GST \$23.50 (72475)	GST INC \$258.50
For Portégé 7000/7020	
GST Ex \$269 + GST \$26.90 (66479)	GST INC \$295.50

TOSHIBA Battery Charger

For Tecra 8000	
GST Ex \$366 + GST \$36.60 (29357)	GST INC \$402.60

TOSHIBA Universal AC Adapter

For Tecra 8000/Satellite 4000/4010 & others	
GST Ex \$110 + GST \$11.00 (44200)	GST INC \$121.00

TOSHIBA Additional 2 Year Warranty

For Satellites with TFT Display	
GST Ex \$182 + GST \$18.20 (21729)	GST INC \$200.20

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For Tecra II 750/780/8000	
GST Ex \$610 + GST \$61.00 (79226)	GST INC \$671.00

TOSHIBA Desk Station V+

For Tecra 500/550/650/700/750/8000 Series	
GST Ex \$1,138 + GST \$113.80 (25446)	GST INC \$1,251.80

TOSHIBA Carry Bags

Toshiba Friend Carry Bag	
GST Ex \$67 + GST \$6.70 (75901)	GST INC \$73.70
Leather Bag for A4 Notebooks	
GST Ex \$174 + GST \$17.40 (68408)	GST INC \$191.40



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**Multibay
CD-
Option
for iPaq**
GST Ex
\$183 + GST
\$18.30
GST Inc
\$201.30
(A2348)

*NO MONITOR	iPaq Legacy
Processor	Pentium III 500
RAM	128Mb
Hard Disk	8.4Gb
Win 95/98	
Part #	(A2060)*
Rent 3 Yrs**	\$17.80
GST Ex + GST:	\$1,450 + \$145.00
GST Inc	\$1,595.00
Win NT 4.0	
Part #*	(A2341)*
Rent 3 Yrs**	\$19.59
GST Ex + GST:	\$1,653 + \$165.30
GST Inc	\$1,818.30
Win 2000	
Part #*	(A2342)*
Rent 3 Yrs**	\$19.59
GST Ex + GST:	\$1,653 + \$165.30
GST Inc	\$1,818.30

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***RentSmart**
The figures shown are based on a per week basis over 3 years. To approved persons, Terms and Conditions apply. GST May apply to commitments made now! Refer to Page 2 for more details.

**Compaq
Monitors**
15" S510
Monitor
GST Ex
\$325 + GST
\$32.50
GST Inc
\$357.50
(A0067)
17" S710
Monitor
GST Ex
\$511 + GST
\$51.10
GST Inc
\$562.10
(97852)

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Notebooks



Armada E500

With stability, quality and reliability, this easy-to-use notebook delivers beyond the latest key core technologies and value for money

*NO MONITOR	Armada E500	Presario 1200-XL
Processor	PIII 500MHz	AMD 500MHz
RAM	64MB	64MB
Hard Disk	6.4GB	5.0GB
Screen	13.3" TFT	12.1" HPA
CD-ROM	Yes	24xCD
Modem	56K	56K
Op System	Win NT	Win 98SE
Part #	(94878)	(A2055)
Rent 3 Yrs**	\$36.85	\$22.90
GST Ex + GST:	\$3,967 + \$396.70	\$2,465 + \$246.50
Inc Tax	\$4,363.70	\$2,711.50

Deskpro

DeskPro EN

Compaqs Deskpro range of desktop PCs give you the power to perform, providing a professional solution for networked and enterprise environments. Offering flexible design, outstanding long-life performance and serviceability, Compaq Deskpro PCs are the manageable enterprise PCs you can count on.



DeskPro EP



*NO MONITOR	EN	EN	EN SFF	EP
Processor	Celeron 500MHz	PIII600EBMHz	PIII600MHz	Celeron 500MHz
RAM St/Max	64MB/512MB	64MB/512MB	128MB/512MB	64MB/512MB
Hard Disk	6.4GB	13.5GB	13.5GB	6.4GB
Graphics	8MB Integrated	16MB Matrox	16MB Matrox	8MB Integrated
CD-ROM	No	40xCD	40xCD	No
Win 95/98				
Part #*	(91432)*	(91411)*	(91408)	(95932)*
Rent 3 Yrs**	\$15.86	\$25.33	\$26.98	\$14.02
GST Ex + GST:	\$1,338 + \$133.80	\$2,727 + \$272.70	\$2,904 + \$290.40	\$1,183 + \$118.30
Inc Tax	\$1,471.80	\$2,999.70	\$3,194.40	\$1,301.30

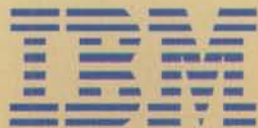
** RentSmart rates are higher when Equipment value is less than \$2,000

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- Pentium III 500MHz
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- 24 x CD-ROM
- 12.1" TFT screen
- Windows 2000



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GST Ex \$3,452 + GST \$345.20 (A0696) GST INC

\$3,797.20

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ThinkPad T20

- Pentium III 700SSMHz
- 128MB RAM standard
- HDD 12GB
- 6 x DVD
- 14.1" TFT screen
- Windows 2000



Rent 3 years - \$66.80**

GST Ex \$7,190 + GST \$719 (A0702) GST INC

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NetVista S40 LEGACY-FREE

Processor	PIII667MHz	PIII733MHz
RAM	128MB	128MB
HDD	10GB	20GB
CD-ROM	40X CDROM	40X CDROM
LAN	10/100 NIC	10/100 NIC
Op System	Windows 2000	Windows 2000
Rent TAP	\$18.72	\$21.72**
Part No	(A1299)	(A1300)
GST Ex	\$2,015	\$2,317
+GST	\$201.50	\$231.70
=GST INC	\$2,216.50*	\$2548.70*



* Monitor not included

** Inc GST per week over 3 years

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Netfinity 3000/5000 Servers



Netfinity 5000

- Pentium III 600MHz
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- Ethernet Integrated Network Interface
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Rent 3 yrs - \$40.13**

GST Ex \$4,320 + GST \$432.00 (82774)

GST INC **\$4,752.00**

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Netfinity 3000

- Pentium III 600MHz
- 64MB RAM standard
- HDD 9.1GB
- Maximum storage capacity 72.8
- 512KB Level 2 Cache
- CD-ROM 32x max
- 10/100BaseTX Integrated Network Interface

Rent 3 yrs - \$25.99**

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- * Hasbro 3 game CD: Sorry!, Yahtzee, Smart Games Challenge II*
- * World Book Multimedia Encyclopaedia
- * Aspire time Machine System recovery
- * MS Windows 98SE/1.E.5.0
- * Microsoft Works 4.5
- * Hasbro Interactive Battleship*
- * Acer Camera Software Site**
- * Aspire webSIGHT**
- * Acer Computer Explorer*
- * PC-Cillin antivirus
- * PC-Doctor
- * My Aspire Guide
- * Aspire Recovery CD
- * KidDesk Internet Safe

* Not included with Aspire 6400

** Included only with Aspire 6400

	NEW! Aspire 6300	NEW! Aspire 6400	
CPU	Celeron 600MHz	Pentium III 677MHz	Pentium III 800MHz
RAM	64MB	64MB	128MB
HDD	10GB	10GB	10GB
CD/LAN	8X4X32 CD-RW	8X4X32 CD-RW	8X4X32 CD-RW
VIDEO	Integrated UMA 8MB	nVidia TNT-2 16MB	nVidia TNT-2 16MB
OS	Win98 2nd Edition	Win98 2nd Edition	Win98 2nd Edition
Part number	(99775)	(A2422)	(A2423)
RentSmart*	\$21.53/Week	\$21.30/Week	\$25.55/Week
GST EX	\$1,817	\$2,293	\$2,751
GST	\$181.70	\$229.30	\$275.10
GST Inc	\$1,998.⁷⁰	\$2,522.³⁰	\$3,026.¹⁰

All Aspires standard with 15" Monitor, speakers v.90 56k internal fax and microtower housing

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The Perfect combination of connectivity, portability and design elements.



Model	520iT	521TXV
Screen	12.1" TFT	14" TFT
CPU	C550	PIII600
Memory	64MB	64MB
HDD	4.8GB	6GB
CD-ROM	24xCD	NO
DVD	NO	6xDVD
Fax/Modem	56Kbps	56Kbps
LAN Card	10/100 LAN	10/100 LAN
Op. system	Windows® 98	Windows® 98
Part number	(A2424)	(A2425)
GST Ex	\$2,951	\$4,449
GST	+ \$295.10	+ \$444.90
GST INC	\$3,246.10	\$4,893.90

Model	345T (CD)	345T (DVD)	508DX	602TER
Screen	12.1" TFT	12.1" TFT	12.1" TFT	13.3" TFT
PU	PIII 600	PIII 600	C500	PIII 650 SpeedStep
RAM	64MB	64MB	32MB	64MB
HDD	6GB	6GB	4.8GB	12GB
Graphics	2.5MB	2.5MB	2MB	8MB
CD-ROM	24 x CD	NO	24 x CD	20x4x4 CD-RW
DVD	NO	2 x DVD	NO	NO
Fax/Modem	56Kbps	56Kbps	56Kbps	56Kbps
Other	10/100 Lan	10/100 Lan	NO	10/100 Lan
OS	Win 98 SE	Win 98 SE	Win 98 SE	Win 98 SE
Part	(xxxxx)	(xxxxx)	(A2427)	(A2426)
GST EX	\$Call	\$Call	\$2,251	\$5,358
GST	\$Call	\$Call	\$225.10	\$535.80
GST Inc	\$Call	\$Call	\$2476.¹⁰	\$5,893.⁸⁰

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New Look. New Features. And now even faster. Sporting the futurising-looking Three-Toned Flint, Slate & Titanium Gray tower casing, the highly advanced HP Pavilion 8600 series is powered by dynamic Intel Pentium III and AMD Athlon processors. Innovative new features include CD-ROM storage at the top of the chassis for up to 8 CDs, CD reading and writing capabilities (depending on the model), and conveniently located front connections to USB and serial ports. The enhanced HP Pavilion one-touch multimedia keyboard provides instant access to frequently used functions, and the Internet buttons link you directly to your favourite websites via the ISP with whom you can register directly free* of charge or as a subscriber. Easily expandable and upgradeable, these are powerfully attractive PCs at a powerfully attractive price! * Terms and conditions apply

Pavilion 6600 Series



Pavilion 8600 Series



Model	6617	6621	8637	8632
CPU	Celeron® 566MHz	Celeron® 600MHz	ATH750MHz	PentiumIII 866MHz
Memory	64MB	64MB	128MB	128MB
HDD	10.2GB	15GB	20GB	20.4GB
CD-ROM	48xCD	48xCD	CDR-W	8xDVD & CDRW
Modem	V.90 56Kbps	V.90 56Kbps	V.90 56Kbps	V.90 56Kbps
Op. system	Windows® 98SE	Windows® 98SE	Windows® 98SE	Windows® 98SE
Monitor	15"	17"	15"	17"
Part number	(A1174)	(A2402)	(A2403)	(A1181)
GST Ex + GST	\$1,544 + \$154.40	\$1,817 + \$181.70	\$2,726 + \$272.60	\$4,544 + \$454.40
GST INC	\$1,698.40	\$1,998.70	\$2,998.60	\$4,998.40
Monitor	17"		17"	19"
Part number	(A2413)		(A1179)	(A2404)
GST Ex + GST	\$1,726 + \$172.60		\$2,908 + \$290.80	\$4,817 + \$481.70
GST INC	\$1,898.60		\$3198.80	\$5,298.70

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autosensing
on every port.

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Next Day
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+ GST: \$44.40
(79125)
GST INC:
\$488.40

HP ProCurve 2224 Switch

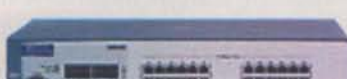


Low-cost desktop switch ideal for
delivering performance to
workgroups with a mix of 10Mbps
and 100Mbps devices and for mi-
grating from 10Base-T to 100Base-
TX:

- 24 10/100Base-TX autosensing ports
- One open transceiver slot
- Unmanaged
- Low, industry-leading price

Rent 3yrs - **\$12.15***
GST Ex: \$1,025 + GST: \$102.50
(75515) GST INC:
\$1,127.50

HP ProCurve Switch 2424M



Desktop switch ideal for low-cost
migration to 10/100 stackable
switching:

- 24 10/100Base-TX autosensing ports
- Open module slot for Gigabit stacking and uplinks
- Managed
- Low industry-leading price
- FREE Top Tools software included

Rent 3 yrs **\$23.64***
GST Ex: \$1,995 + GST: \$195.50
(75513) GST INC:
\$2,194.50

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A feature-rich, modular 10/100/
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expandable, low-cost migration to
10/100/Gigabit switching to the
desktop. Free Top Tools software incl.

GST Ex: \$3,799 + GST: \$379.90
(66063) GST INC: **\$4,178.90**
Optional Gigabit Module for
GST Ex: \$1,706 + GST: \$170.60
(76563) GST INC: **\$1,876.60**

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include: 7
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floppy, CD-
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slots (4 PCI,
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combination),
integrated 10/
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NetServer E200 HP leads the top tier server suppliers offering full
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- Intel PIII600 MHz processor with 133MHz front size bus
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- 9.1GB, 7200rpm, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
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GST Ex: \$2,402 + GST: \$240.20

(A1489) GST INC: **\$2,642.20**

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Removable, generously proportioned hard disk drive for all user needs.



Connectivity
Lockable USB, serial, parallel, PS/2 and LAN ports to fit your computing environment.



Media Choice
Fast, slim CD and media-free models.



Power
Powerful Intel Pentium III and Celeron processor configurations and generous RAM to suit any business application.



Operating Systems
Choose from a range of Microsoft operating systems including Windows 2000 to match your corporate standard.



e-Diagnostics
The intelligent eDiagTools technology allows instant problem identification and web-enabled notification to HP or your support staff.

Processor:	Celeron 500	Celeron 533	PentiumIII 600	PentiumIII 667
SDRAM	64MB	128MB	128MB	256MB
Hard Disk	8.4G	8.4G	8.4G	8.4G
FDD	optional	no floppy	optional	optional
Monitor	no	no	no	no
CD - ROM	no	24x	24x	24x
OS	Win 98	Win 98	Win 2000	Win 2000
GST Ex	\$1,016	\$1,326	\$1,755	\$2,345
+ GST	+\$101.60	+\$132.60	+\$175.50	+\$234.50
Part No.:	(98419)	(98420)	(98421)	(98422)
GST INC:	\$1,117.⁶⁰	\$1,458.⁶⁰	\$1,930.⁵⁰	\$2,579.⁵⁰
Rent 3 Yrs*	\$12.04 per wk	\$15.71 per wk	\$20.80 per wk	\$21.78 per wk



Accredited Workgroup Reseller
HEWLETT PACKARD

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Burwood (Melbourne)

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Not all products are in-store, but consulting & advice available on all items

Fly Buys.
Collect Fly Buys points on your computer hardware & software when you purchase from Harris Technology.

* Rent available To Approved Purchases. - Based on 3 year term for business use. Rental prices quoted include GST.

AUG 13

Sales: 1300 13 9999
Fax: 1300 13 6666

Website: www.ht.com.au
E-mail: sales@ht.com.au

Order on-line
www.ht.com.au

Enjoy a world of difference

Established around the world since 1990, Compucon brand has become a trusted name in the PC industry

An international brand with locations throughout the Asia-Pacific region and North America

Quality-accredited under ISO9002 standard of excellence, Winner of many Editor's Choice & 'Best Product' awards.



****RentSmart**
The figures shown are based on a per week basis over 3 years. To approved persons, Terms and Conditions apply. GST May apply to commitments made now! Refer to Page 2 for more details.

Compucon AMD



500MHz

- 10.2GB Ultra DMA 66Hard Disk Drive
- 32MB PC100 SDRAM
- 4MB AGP Graphics Card (ATI Rage IIc)
- 1 x AGP, 4 x PCI and 3 x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95 or 98
- PS/2 104-key Keyboard
- Midi-Tower Case

- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$12.25.**
GST Ex \$1,076 + GST \$107.60
(A2358) GST Inc

\$1,183.60*

* Monitor Not included

This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$15.96.** GST Ex \$1,347 + GST

\$134.20 GST Inc: **\$1,481.70**

Monitor price is
GST Ex \$284 + GST \$28.40

(25874) GST Inc **\$312.40**

Intel Celeron



533MHz

Intel Celeron Processor

- PS/2 Wheel Mouse
- Windows 95 or 98
- 10.2GB Hard Disk Drive
- 32MB SDRAM
- 4MB AGP Graphics Card (ATI RanRge)
- 1x AGP, 3x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- 10MB Combo Network Card

- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$13.78.**
GST Ex \$1,163 + GST \$116.30
(A2359) GST Inc

\$1,279.30*

* Monitor Not included

This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$16.77.** GST Ex \$1,447+ GST

\$144.70 GST Inc: **\$1,556.70**

Monitor price is
GST Ex \$284 + GST \$28.40

(25874) GST Inc **\$312.40**

Intel Pentium III



667MHz

Intel Pentium III Processor

- 10.2GB Hard Disk Drive
- 32MB SDRAM
- 4MB AGP Graphics Card (ATI Range)
- 1x AGP, 4x PCI and 3x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95
- PS/2 104-key Keyboard
- 10MB Combo Network Card

- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$16.97.**
GST Ex \$1,432+ GST \$143.20
(A2361) GST Inc

\$1,575.20*

* Monitor Not included

This system with 17" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$21.76.** GST Ex \$1,836 + GST

\$183.60 GST Inc: **\$2,019.60**

Monitor price is
GST Ex \$404 + GST \$40.40

(25906) GST Inc **\$444.40**

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14

**HARRIS
TECHNOLOGY™**

Pricing** and specifications herein are subject to change without notice.



Finance methods subject to approval

Power Back Up = Power Protection

APC BACK UPS PRO®

FOR HUBS, SWITCHES,
ROUTERS

Smart battery backup and high performance surge suppression for Windows 95 & NT PCs

- PowerChute® Plus software lets your UPS shut down your applications gracefully in the event of an extended power failure
- Audible alarms
- Additional outlet for protection of printers
- Phone/modem protection
- User replaceable, hot swappable batteries



APC Back-UPS Pro 280si

GST Ex \$255 + GST \$25.50

(76636) GST INC

\$280.50

APC Back-UPS Pro 420si

GST Ex \$350 + GST \$35.00

(76637) GST INC

\$385.00

APC Back-UPS Pro 650si

GST Ex \$426 + GST \$42.60

(76638) GST INC

\$468.60

APC Surge Arrest

PNote Pro®

SurgeArrest is equipped with a fast acting fuse that reacts quickly to lightning strikes and other catastrophic surge events. In addition, a thermal fuse shuts your system down in the event of a dangerous wiring fault. In both cases, SurgeArrest actually blocks errant power from reaching your equipment if the surge components are damaged

The SurgeArrest Notebook Pro Surge Protector provides the mobile notebook professional with advanced AC and telephone line protection. The unique, in-line design creates a compact, lightweight surge protector that is truly portable and appropriate for use in any country throughout the world. With built-in Excess Current Detection, the Notebook Pro warns you against potential modem damage. A Velcro mounting strap and 6 ft. telephone cord eliminate the need to carry any additional accessories.



SurgeArrest 5 Strip

GST Ex \$52

+ GST \$5.20

(99591) GST INC

\$57.20



PNote Pro

GST Ex \$58

+ GST \$5.80

(99592) GST INC

\$63.80

APC Smart-UPS 2U Rack Mounts®

FOR SMALL
OFFICE SERVERS

New! Smart-UPS 700, 1000, and 1400 2U Rack Mounts

Utilizing Surface Mount Technology, more Application-Specific Integrated Circuits, and fewer components, we have created a more reliable UPS. New 2U(3.5in/8.89cm) design saves valuable rack U space. These models require 30% less rack height and will still fit into a 600mm four-post rack!



APC Smart-UPS 2u700

GST Ex \$809 + GST \$80.90

(99595) GST INC

\$889.90

APC Smart-UPS 2u1000

GST Ex \$1,101 + GST \$110.10

(99596) GST INC

\$1,211.10

APC Smart-UPS 2u1400

GST Ex \$1,582 + GST \$158.20

(99597) GST INC

\$1,740.20

Fly Buys

Want
Fly Buys
with that?
Call Harris
Technology
for more
information



**Back-Ups
for PC's!**

300va

GST Ex \$171

+ GST \$17.10

(56229) GST INC

\$188.10

500va

GST Ex \$207

+ GST \$20.70

(56230) GST INC

\$227.70

650va

GST Ex \$258

+ GST \$25.80

(56231) GST INC

\$283.80

APC

Symmetra

Power Array

8kVA, exp. to

16kVA

GST Ex \$12,492+

GST \$1,249.20

(71087) GST INC

\$13,741.20

So good we use

it ourselves!

AUG

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Apply Online And Get the Technology You Need- Today!

FAST ONLINE APPROVAL!

THE FASTEST WAY TO GET THE EQUIPMENT YOU NEED AND SAVE MONEY!

RentSmart and Harris Technology are proud to introduce Australia's first online computer finance facility, available to your business at the Harris website today!

Now you can shop online with Harris and be approved for up to \$15,000 in RentSmart finance in just minutes.

You can afford more with RentSmart through cashflow friendly monthly payment that are fully tax deductible for business purposes.*

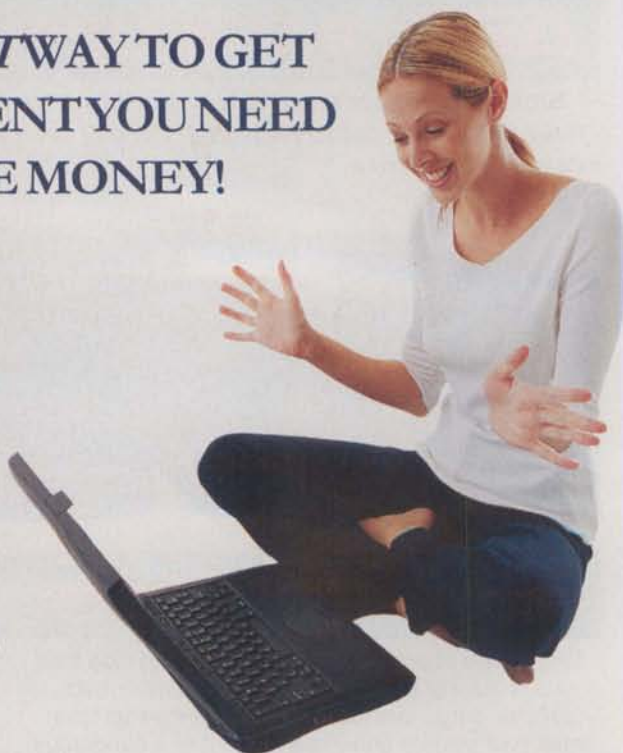
What's more, renting means you can upgrade to new technology when you need.

Here's how it works:

- 1 Simply shop for the equipment you need on the Harris site now.
- 2 Select RentSmart as your chosen payment method.
- 3 Complete the quick, secure online application form.
- 4 If you are approved with RentSmart, your RentSmart account will be automatically set up in just minutes.

RentSmart will then send you your application to sign, and your equipment will be ordered.

Remember, renting is the cost-effective solution for businesses to get the technology they need to succeed.



Check out how little RentSmart costs:

Purchase Price (GST Inclusive)	36 Months (per week)	24 Months (per week)
\$1000	\$10.77	\$14.00
\$2000	\$21.55	\$28.01
\$3000	\$25.33	\$35.65
\$5000	\$42.23	\$59.42

For more information, phone now on Freecall:

Harris Technology RentSmart
1300 13 99 99 1800 688 777

Prices intended as a guide only. RentSmart is available to qualifying customers on selected products with a total retail value above \$500.

*Consult your accountant for further advice.

Facilities mentioned on this page available after the 4th July 2000.

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Pricing** and specifications herein are subject to change without notice.



Finance methods subject to approval

Mobile Access Solutions

Check for latest
prices & products!

Xircom RealPort 2

The only access cards with integrated connectors!
No more hassles with fragile cables and pop-out jacks.

The Only Personalized Notebook Communications Solutions: The RealPort2 Integrated PC Card with Built-in Connectors and Mix and Match Flexibility. RealPort2 Integrated PC Cards with built-in connectors add flexibility by enabling users to choose from a wide variety of access cards that can be used alone or mixed and matched to meet communications requirements now and in the future. Combine a 56K modem, 10/100 Ethernet LAN, wireless data access via your mobile phone, ISDN and more!

5 Easy steps as follows



1

Choose Desired
Realport2 Cards



2

Flip one RealPort2
card over and place
on top of the other



3

Align tabs and join
cards



4

Insert joined cards
into PC Card slot of
Notebook



5

Plug in cables



**Realport2 Global
Access Modem**

GST Ex: \$325 + GST: \$32.50
(92739) GST Inc: **\$357.⁵⁰**



**Realport2 10/100
Ethernet Card 16 bit**

GST Ex: \$264 + GST: \$26.40
(92746) GST Inc: **\$290.⁴⁰**



**Realport2 CardBus 10/
100 Ethernet 32 bit**

GST Ex: \$263 + GST: \$26.30
(92756) GST Inc: **\$289.³⁰**

Xircom NetStation

The All in One Conference Room Networking Solution

- Mounting holes and lock compatibility provide security options
- Auto negotiation of 10 or 100 Mbps (NWay) network speeds
- Half or full duplex at both speeds for increased network performance
- Two Diagnostic LEDS per port provide connection status at a glance
- Dedicated bandwidth to each user



NetStation 4 Port

GST Ex: \$847 + GST: \$84.70
(A0945) GST Inc: **\$931.⁷⁰**



NetStation 8 Port

GST Ex: \$1,345 + GST: \$134.50
(A0947) GST Inc: **\$1,479.⁵⁰**



NetStation set up is a SNAP!



1

Plug combined power/
Ethernet cable into unit



2

Place NetStation on



3

Pull retractable
Ethernet cable and
plug into network jack

Xircom Rex 5000 Companion

Worlds smallest Connected Organizer.



Powerful - Access up to 6000 Entries
Portable - Credit Card Sized, and weighs only 1.4 ounces, so you can take your important data with you.

Easy to Use - Includes everything you need to get organized, synchronise with software on your computer.

- Display: 9-line, high-contrast 160 x 98 black-and-white LCD
- Memory 512K
- Size: 3-3/8" x 2-1/8" x 1/4"

GST Ex: \$165 + GST: \$16.50
(86631) GST Inc: **\$181.⁵⁰**

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Not all
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www.ht.com.au
sales@ht.com.au

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Kiosks! See Page 2**

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Cost-effective Connectivity Solutions

10/100MBPS FAST ETHERNET SWITCHES



The NETGEAR FS105 and FS108 feature 5 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible. Compact and easy to install. Vista jacks with built-in LEDs.

FS 105

5 Port Autosensing

GST Ex: \$190 + GST: \$19.00
(84722) GST Inc: **\$209.00**

FS 108

8 Port Autosensing

GST Ex: \$366 + GST: \$36.60
(70905) GST Inc: **\$402.60**



The NETGEAR FS516 & FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516

16 Port Autosensing

GST Ex: \$962 + GST: \$96.20
(60522) GST Inc: **\$1,058.20**

FS 308

8 Port Autosensing

GST Ex: \$510 + GST: \$51.00
(77242) GST Inc: **\$561.00**

FS 524

24 Port Autosensing

GST Ex: \$1163 + GST: \$116.30
(77549) GST Inc: **\$1,279.30**

GIGABIT SWITCHES

These 3 new gigabit switches from Netgear make it possible for small businesses and branch offices to fulfill requirements for higher bandwidth as their networks become increasingly congested. The switches provide customers a faster server connection and allow multiple Fast Ethernet users to access the server at 100 Mbps at the same time.

FS 510T

Eight switched 10/100Mbps ports + two 1000Mbps port (Category 5)

GST Ex: \$1635 + GST: \$163.50
(A1209) GST Inc: **\$1,798.50**

FS 518T

Sixteen switched 10/100Mbps ports + two 1000Mbps ports (Category 5)

GST Ex: \$2706 + GST: \$270.60
(A1374) GST Inc: **\$2,976.60**

GS 504T

Four full-duplex Gigabit Category 5 ports

GST Ex: \$2,978 + GST: \$297.80
(A1375) GST Inc: **\$3,275.80**

Please Note that Fibre Gigabit Switches are also available

GIGABIT NETWORK CARD



GA 620T

Gigabit Network Interface Card

GST Ex: \$644 + GST: \$64.40
(A1382) GST Inc: **\$708.40**

ISDN ROUTER



Latest technology with ease-of-use designs. Compatible with all major Internet ISDN equipment, this is the ideal router for Internet access, LAN-to-LAN connection, and remote access for a single user, small business or branch office over ISDN. Includes auto sensing input 10/100 network port & caller ID on phone ports.

RT 338

GST Ex: \$630 + GST: \$63.00
(97718) GST Inc: **\$693.00**

ANALOG MODEM ROUTER

Connect multiple PCs to the Internet easily. Router + integrated 56K modem + integrated 4-port 10BaseT hub + DHCP server + Dynamic NAT+ + Dial-on-Demand-routing + Hi/fn (STAC LZS) compression + 5 year warranty



RM 356

GST Ex: \$509 + GST: \$50.90
(70197) GST Inc: **\$559.90**

CABLE/DSL INTERNET GATEWAY



Connect multiple PCs to share single IP address. The NETGEAR RT311 provides NAT service that allows up to 32 users on your 10/100 network to share the high-speed Internet connection. At the same time it also provides firewall protection to guard your network against hackers and unauthorised access from the Internet.

RT 311

GST Ex: \$535 + GST: \$53.50
(97719) GST Inc: **\$588.50**

ISDN ROUTER

Home office Internet access in a box. Includes built-in ISDN TA, 128 MultiLink PPP, DHCP Server, Dynamic NAT+, Dial-on-Demand Routing. Provides Internet access, LAN-to-LAN intranet connection, and remote access for a single user, a small business, or a branch office over ISDN.



RT 328

GST Ex: \$579 + GST: \$57.90
(68900) GST Inc: **\$636.90**



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Take the Work out of Networking

NETWORK STARTER KITS



Free
modem sharing
software

The NETGEAR Network Starter kits give Windows users everything they need to start networking right away at either 10 Mbps or 100 Mbps. The kits containing 10/100 PCI cards, a hub or switch, network cables, modem sharing software and an easy to read how to guide. Within a few minutes, you will be able to share files and printers, exchange emails, play interactive games and share access to the Internet.

DB 104

GST Ex: \$255 + GST: \$25.50

(77292) GST Inc: **\$280.50**

4 Port Dual speed starter kit

SB 105

GST Ex: \$128 + GST: \$12.80

(13277) GST Inc: **\$140.80**

5 Port 10 Mbs starter kit

FB 105

GST Ex: \$347 + GST: \$34.70

(73997) GST Inc: **\$381.70**

5 Port switch starter kit

Netgear offers FREE 24-hour phone support



10/100 DUAL SPEED HUBS

These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix & match 10 and 100Mbps PCs, servers and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.



DS 104

GST Ex: \$156 + GST: \$15.60

(70795) GST Inc: **\$171.60**

4 Port Slim Line

DS 106

GST Ex: \$198 + GST: \$19.80

(84721) GST Inc: **\$217.80**

6 Port Slim Line

DS 108

GST Ex: \$246 + GST: \$24.60

(18755) GST Inc: **\$270.60**

8 Port Slim Line

DS 116

GST Ex: \$435 + GST: \$43.50

(81519) GST Inc: **\$378.50**

16 Port Slim Line

DS 309

GST Ex: \$412 + GST: \$41.20

(87479) GST Inc: **\$453.20**

8 Port Stackable

DS 508

GST Ex: \$525 + GST: \$52.50

(18738) GST Inc: **\$577.50**

16 Port Stackable

DS 516

GST Ex: \$676 + GST: \$67.60

(18747) GST Inc: **\$743.60**

24 Port Stackable

DS 524

GST Ex: \$866 + GST: \$86.60

(69474) GST Inc: **\$952.60**

24 Port Stackable

PRINTER SERVERS



The NETGEAR print servers let you share any parallel printer among all users on the network without having to dedicate a PC for print serving and without complex setup and configuration.

These print servers connect directly to the network and can be placed anywhere convenient to the users. With a built-in network 4 port hub, the PS105 is an all-in-one connectivity solution for the SOHO users- providing file, print and resource sharing as well as network gaming.

PS 105

GST Ex: \$204 + GST: \$20.40

(67225) GST Inc: **\$224.40**

10Mbps Print Server

PS 110

GST Ex: \$253 + GST: \$25.30

(67226) GST Inc: **\$278.30**

The PS110 attaches to a 10 or 100Mbps hub or switch, providing effortless transition from Ethernet to Fast Ethernet. It also supports 2 parallel printers.

PS 113

GST Ex: \$X.xx + GST: \$X.xx

(xxxxx) GST Inc: **\$Call**

10/100Mbps print server supports up to 3 parallel printers

10MBPS ETHERNET HUBS



Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support option • Limited lifetime warranty • Easy plug and play installation

EN 104TP

GST Ex: \$62 + GST: \$6.20

(53456) GST Inc: **\$68.20**

4 Port Slim Line

EN 108TP

GST Ex: \$95 + GST: \$9.50

(53458) GST Inc: **\$104.50**

8 Port Slim Line

EN 116

GST Ex: \$211 + GST: \$21.10

(53459) GST Inc: **\$232.10**

16 Port Slim Line

EN 516

GST Ex: \$214 + GST: \$21.40

(17425) GST Inc: **\$235.40**

16 Port Rackmount

EN 524

GST Ex: \$292 + GST: \$29.20

(17435) GST Inc: **\$321.20**

24 Port Rackmount



• 16 or 24 10BASE-T ports • Easy plug and play installation • Vista network port with built-in LEDs • BNC/AUI backbone support • Internal power supply

NETGEAR

FA 310

Ethernet
Adapter 10/
100 PCI



(53460)

GST Ex: \$51

GST: \$5.10

GST Inc: **\$56.10**

FA 312

Wake on
Lan card
(xxxxx)

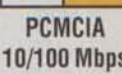
GST Ex: \$Call

GST: \$Call

GST Inc: **\$Call**

FA 410

PCMCIA
10/100 Mbps
Network Card



(60071)

GST Ex: \$149

GST: \$14.90

GST Inc: **\$163.90**

FA 510

Network Card
for Notebook
PC

(81319)

GST Ex: \$156

GST: \$15.60

GST Inc: **\$171.60**

FA 510

Network Card

for Notebook

PC

(81319)

GST Ex: \$156

GST: \$15.60

GST Inc: **\$171.60**

FA 510

Network Card

for Notebook

PC

(81319)

GST Ex: \$156

GST: \$15.60

GST Inc: **\$171.60**

FA 510

Makes Networking Easy

Intel® InBusiness™ 4-port and 8-port Fast Hubs

Simple Fast Ethernet Connectivity for small Business networks

Intel® InBusiness™ are designed for speedy transfer of large files, database access, multimedia applications, and any other activities that require faster network performance. A crossover port enables multiple hubs to be connected for network expansion.



- Easily Connects devices to create Fast Ethernet networks
- Crossover port for expandability
- Autosensing 10/100 ports, requiring no configurations
- Covered by a limited lifetime warranty

8 Port Fast Hub

GST Ex \$232 + GST \$23.20

(58546) GST Inc **\$255^{.20}**

4 Port Fast Hub

GST Ex \$163 + GST \$16.30

(58546) GST Inc **\$179^{.30}**

Intel® pro/100+ Management Adapters

Fast, manageable 10/100 network connections

Driver Compatibility - Intel compatible network drivers lower cost of maintenance.

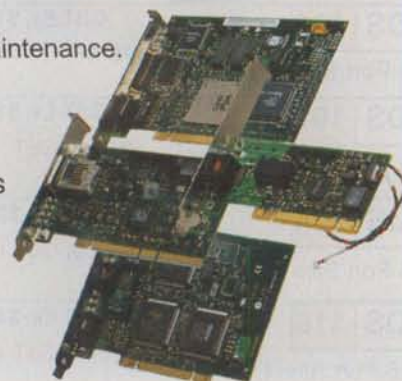
Drivers configure quickly and easily with Intel® PROSet utility

Built-in advanced management capabilities

- Wake on LAN for remote system wake-up and troubleshooting
- PRO/100+ Boot agent for remote PC deployment and upgrades
- ACPI compliant for flexible power management
- Desktop Management Interface (DMI) 2.0 for remote asset management
- Tivoli agent and Intel LANDesk® Client Manager included for easy management access

Lead-in performance

- Intel's Adaptive Technology increases network response time while keeping CPU utilization low
- Intel Priority Packet improves bandwidth control
- 10/100 autosensing full-duplex



PRO/100+ Management Adapter

GST Ex \$152 + GST \$15.20

(75328) GST Inc **\$167^{.20}**

Intel® InBusiness™ Print Station

The Ideal Solution for small businesses needing to easily share resources and increase productivity

The Intel InBusiness Print Station is the easy way to share printers over a network. Setup is so simple that within minutes your small-business customers can be printing to shared printers over 10Mbps or 100Mbps network. The Intel InBusiness Print station is part of a complete line of networking products designed specifically for Small Business.

- Connects printers to the network independent of PC's
- Supports two printers with single 10BASE-T or 100BASE-TX connection.
- Increase productivity by conveniently locating printers
- Simple installation wizard
- Offers a complete solutions



GST Ex \$288 + GST \$28.80

(93464) GST Inc **\$316^{.80}**



Intel®
InBusiness™
10/100
Switches
Simple,
increased
network
performance for
standard Fast
Ethernet

4 Port

GST Ex \$207 + GST
\$20.70

GST Inc

\$227.70

(A2295)

8 Port

GST Ex \$276 +

GST \$27.60

GST Inc

\$303.60

(73567)



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Collect
Fly Buys
points on
your
computer
hardware &
software
when you
purchase
from Harris
Technology.

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Small-Medium Business Networks

DES-3624IF

24 Port Stackable Giga Switch



The DES-3624IF unit offers 24 ports of 10/100TX. Plus 1 100 base FX (SC) port build in SNMP and RMON agents. Optional giga module available.

**NEW
PRODUCT**

GST Ex: \$2128 + GST: \$212.80
(90759) GST Inc: **\$2,340.80**

DES-1016R

16 Port Switch for Workgroups



Built with advanced functions, these switches are designed for the workgroups with advanced requirements. Powerful yet easy to use, they allow users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidth, boost response time and satisfy heavy load demand.
Rack mountable.

GST Ex: \$999 + GST: \$99.90
(69456) GST Inc: **\$1,098.90**

DES-1024R

24 Port Switch for Workgroups



24 port Auto negotiating 10/100Mbit Switch (NWay). Supports UTP/STP cables. MDI-II Uplink ports Support Full/Half duplex. Provides cut-through and fast store & forward switching. Rack mountable.

GST Ex: \$1356 + GST: \$135.60
(76740) GST Inc: **\$1,491.60**

DES-1008D

8 Port Fast Ethernet Switch



The D-Link DES-1008D is a powerful desktop Dual Speed 8-port 10/100Mb Ethernet/Fast Ethernet NWay auto-negotiating Switch.

GST Ex: \$328 + GST: \$32.80
(98254) GST Inc: **\$360.80**

DI-701

Cable ADSL Gateway

The D-Link DI-701 Residential Gateway protects your computers from hackers or unwanted users. It is the easiest and safest way to share your high-speed Internet connection with a DSL Modem or Cable Modem.



**NEW
PRODUCT**

GST Ex: \$430 + GST: \$43.00
(98249) GST Inc: **\$473.00**

DP-601M

Internet Ready Server with Built-In Modem

1 x 10/100Mbps NWay Ethernet Port, 1 x V.90/K56flex modem port. Supports NAT for single ISP user account, Dial-on-Demand, DHCP, PPP, PAP/CHAP Security.



GST Ex: \$401 + GST: \$40.10
(85107) GST Inc: **\$441.10**

Other products available from D-Link

Description	Part#	Gst Ex	+ GST	GST Inc
D-Link DP-300 10/100 Print Server (1xSer,2xPar)	53598	\$333	\$33.30	\$366.30
D-Link DU-560M External V.90 56K Voice/Fax/Data Modem (USB)	98306	\$108	\$10.80	\$118.80
D-Link DFM-560I Internal PCI V.90 56K Voice/Fax/Data Modem	74361	\$66	\$6.60	\$72.60
D-Link DES-3225G 22+2 port 10/100Mbps Mang Switch W/ V-Lan	90755	\$1990	\$199.90	\$2,189.90
D-Link DFE908DX 8 Port 10/100Mbps Dual Speed Hub	60558	\$305	\$30.50	\$335.50
D-Link DFE-916DX 16 Port 10/100Mbps Dual speed hub	87207	\$516	\$51.60	\$567.60
D-Link DFE2624x24-port 10/100Mbps Stackable Dual Speed Hub	98307	\$1064	\$106.40	\$1,170.40
D-Link DP-602 2 Port Internet Network Server	81535	\$338	\$33.80	\$355.30
D-Link DFE-530TX PCI-Bus 10/100Base TX Fast Ethernet Adapter	62956	\$41	\$4.10	\$45.10
D-Link DI-206 6-Port Ethernet Hub ISDN Router	99475	\$572	\$57.20	\$629.20

For all your small to medium business and home network needs please call for more information and pricing. We have an extensive range of fantastic D-Link products on our database.

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Dynalink 56K Voice/Fax/Data Speakerphone Modem

"Good value for money... ease of setup and use is excellent... consistently connects at high speeds." PC World Nov 99



5 Year Warranty

GST Ex \$118 + GST \$11.80

(54361) GST INC **\$129.80**

- V.90 / K56flex dual-mode for high Internet compatibility
- Plug and play, plus friendly QuickGuide for easy installation
- Send and receive faxes from your PC
- Supports FaxStream DUET, Caller ID, Speakerphone Mode and VoiceMail

For more info on any of Dynalink's products, please visit www.dynalink.com.au

* ALL PRODUCTS FREE-CALL TECH SUPPORT! *

Dynalink V.90/56K ISA or PCI Card Modem

5 Year Warranty on ISA



ISA: All the features of the External. Manually configurable Jumper Settings. PCI: Plug and Play Installation - V.90/K56flex dual mode for high Internet compatibility - Telephone answering machine mode - Send and receive faxes from your PC.

ISA: GST Ex \$114 + GST \$11.40 (77577) GST INC **\$125.40**

PCI: GST Ex \$67 + GST \$6.70 (72909) GST INC **\$73.70**

DYNALINK USB POCKET MODEM

5 Year Warranty



- * Super-easy Installation.
- * Free up Slots and IRQs.
- * No Power Supply, No Messy Cables.
- * Dual-mode V.90, Fax machine, Answer machine.
- * Pocket sized for convenience and style!

GST Ex \$126 + GST \$12.60 (A2298)

GST INC **\$138.60**

MagicXpress TView Video Capture Card

"One of the two best cards in terms of picture quality" APC, July 9. Watch TV on your computer monitor and capture incoming video (e.g. from CamCorder). Fully featured, including Teletext and remote control. Resizable window, right up to full-screen (640x480).



Standard: GST Ex \$113 + GST \$11.30 (72860) GST INC **\$124.30**

With FM Tuner: GST Ex \$157 + GST \$15.70 (78482) GST INC **\$172.70**



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Cisco 800 Series



NB- all software sold separately.

The Cisco 800 series router provides enhanced network security and reliability through the power of Cisco IOS software tailored for small offices and telecommuters. It is recommended for small offices of up to 20 users, connecting every user to the Internet or to the corporate LAN with one ISDN line.

Cisco 801 1 Ethernet and 1 ISDN Basic Rate Interface (BRI)

GST Ex \$2,020 + GST \$202.00 (78662) GST INC **\$2,222.00**

Cisco 803 4 - port shared Ethernet hub, 2 analog POTS, & 1 ISDN BRI

GST Ex \$2,270 + GST \$227.00 (72566) GST INC **\$2,497.00**

Cisco 805 Frame Relay, leased line, or async dial-up access to the Internet

GST Ex \$2,520 + GST \$252.00 (80398) GST INC **\$2,772.00**

- Prices exclude tax - Software needs to be purchased separately - Prices are subject to change without notification.

Cisco 1720 Series

Cisco 1720- An

integrated routing solution that delivers optimised security and flexibility in a desktop form factor for small / medium businesses or small branch offices interested in deploying Internet, Intranet and Extranet access. Modular WAN slots to support future growth by providing upgradeable WAN services and higher densities of WAN connections. Features and performances to support new world services including VPN's and broadband technologies. Support for encrypted LAN performances greater than 128kbps. Router configurations that require two ISDN BRI interfaces. An autosensing 10/100 Mbps Fast Ethernet LAN connection to provide easy upgrade to Fast Ethernet.



GST Ex \$2,590 + GST \$259.00 (71554) GST INC **\$2,849.00**

Cisco Catalyst 2900 Series XL



NB- all software sold separately.

Cisco's Catalyst 2900 Series XL is a full line of stand alone, 10 / 100 autosensing Fast Ethernet switches that combine outstanding performance, ease of use, and integrated Cisco IOS software.

Catalyst 2912XL Switch for connecting smaller Ethernet Fast Ethernet workgroups or servers

Low entry price GST Ex \$3,190 + GST \$319.00 (74277) GST INC **\$3,509.00**

Catalyst 2924C XL Dedicated 10 - Mbps or 100 - Mbps connections to individual PC's, servers, and other systems. High-speed uplink flexibility over extended distances with 100BaseFX connections (Catalyst 2924C XL only)

GST Ex \$6,430 + GST \$643.00 (78298) GST INC **\$7,073.00**

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GST Ex \$1826 + GST \$182.60

(A1869) GST Inc **\$2,008.60**

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GST Ex \$2704 + GST \$270.40

(A1867) GST Inc **\$2,974.40**

3Com AirConnect™ 11Mbps Wireless LAN PC Card

GST Ex \$339 + GST \$33.90

(A1868) GST Inc **\$372.90**

3Com® Megahertz® 10/100 LAN+56K

Global Modem CardBus PC Card

One World. One connector. The 3Com® Megahertz® 10/100 LAN+56K* Global Modem CardBus PC Card delivers high-speed LAN and modem connections the world over. A 32-bit CardBus architecture and patented Parallel Tasking® II technology ensure the industry's best 100 Mbps LAN performance, while the V.90 56K standard and Exclusive Line Probing technology deliver the fastest, most reliable modem connections. This versatile PC Card includes our autosensing XJACK® connector that eliminates the need to carry LAN or modem cables. And it's also incredibly easy to use with 3Com's GSM Connection Manager software for hassle-free wireless GSM connections and DynamicAccess® mobile connection manager software to simplify connectivity at multiple locations. Plus, you can quickly add ISDN and other advanced capabilities as you need them.



3Com Megahertz 10/100 LAN + 56K

Global Modem with XJack

GST Ex \$416 + GST \$41.60

(99215) GST Inc **\$457.60**

3Com® Megahertz® 10/100 LAN CardBus PC Card with XJACK®



Get desktop manageability in a PC Card with the 3Com® Megahertz® 10/100 LAN. CardBus PC Card. XJACK® connector delivers durable connections without carrying or losing cables. And this PC Card provides true 100 Mbps Fast Ethernet performance in 32-bit CardBus notebooks. It features low power consumption, guaranteed compatibility, and DynamicAccess® technology.

3Com Megahertz 10/100 Cardbus PC Card XJACK

GST Ex \$283 + GST \$28.30 (74695) GST Inc **\$311.30**

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MediaFORM is the worldwide leader in CD-R duplication and printing solutions. From high throughput manual systems to sophisticated network production systems, MediaFORM offers the most extensive line of CD-R products anywhere.

34 CDs per hour (650MB)

CD-5400L

GST Ex: \$6740
+ GST: \$674.00
(A1921)

GST Inc: **\$7,414**



The CD-5400L and the 5908 are manual standalone duplication systems. Advanced features allow duplication of 8 CDs (4 with the 5400) simultaneously, each in less than 7 minutes. One button operation makes them simple to use while duplicating all current CD formats.

68 CDs per hour (650MB)

GST Ex: \$11920 + GST: \$1192.00
(A2297)

GST Inc: **\$13,112**



DVD-R, breaking new ground!

- External SCSI model
- DVD disc write (3.95/4.7GB)
- Includes Prassi DVD-Rep software and two blank 4.7GB discs.
- DVD-R is a write once medium that can store any type of digital information such as video, audio, images, multimedia files and data.

4.7GB External DVD-R Writer (76615)

GST Ex: \$7690 + GST: \$769

GST Inc: **\$8,453**

AVAILABLE NOW!!!

Pioneer DVD ROM



Networked CD Mirror Server

- Simple connectivity and flexible data access
- Network ready with support for all major network protocols
- Internal Hard disks to cache CD images
- Full support for both CD and DVD formats
- Compact, space saving design
- Easy web browser set-up and compatibility

ProKit 60 CD Server
(A2320)

GST Ex: \$3,575
+ GST: \$357.50

GST Inc: **\$3,932.50**



Media



Pioneer
3.95 GB
DVD-R

Media
GST Ex: \$58
+ GST: \$5.80
(92505)
GST Inc: **\$63.80**

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Surround yourself with the very best

CORDLESS DESKTOP iTOUCH

A cordless keyboard and cordless wheel mouse combination to free you from cords that tangle. No pointing at the computer or clear path required. With convenient iTouch Internet and multimedia controls. Five-year warranty.



GST Ex: \$152 +
GST: \$15.20
(82772)
GST Inc:
\$167.²⁰

CORDLESS DESKTOP PRO

Cordless keyboard designed for easier typing and contoured soft-touch cordless wheel mouse free you from tangled cords. Innovative mouse design maximises comfort and control. Five-year warranty.



GST Ex: \$206
+ GST:
\$20.60
(87605)
GST Inc:
\$226.⁶⁰

QUICKCAM™ EXPRESS

Snap stills. Shoot video. Email them anywhere in one click. Make live video calls! **QuickCam™ Express** – The simple way to get closer™.

- Capture stills and video instantly
- Email images with a single click
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- Over 2 million QuickCams sold
- USB connector for easy installation
- Works with Windows® 95 or 98



GST Ex: \$86 + GST: \$8.60
GST Inc: **\$94.⁶⁰** (80121)

QUICKCAM™ PRO USB

True 640x480 resolution for stunning videos and pictures. With the **QuickCam** software, build fun web pages complete with streaming video or make live video calls (includes a Labtec microphone) over the Internet. Add titles, fade-in and fade-outs, audio tracks and more to your videos. Enhance your pictures with special effects such as sharpen, blur and more. And with the included digital surveillance software, easily set up a digital security camera.



GST Ex: \$227.23 + GST: \$22.72
(70566) GST Inc: **\$249.⁹⁵**

CORDLESS TRACKMAN WHEEL



Experience true comfort and freedom. Thanks to Digital Radio technology, this innovative trackball works without being pointed at the computer, even on crowded desks. Patented optical technology delivers superior precision, reduced wear and smooth tracking. Five-year warranty.

NEW!
GST Ex: \$150 + GST: \$15.00
(A2157) GST Inc: **\$165.⁰⁰**

TRACKMAN MARBLE FX



Revolutionary, finger-operated trackball. Optical sensing technology provides unmatched reliability and precision. Personalize performance by assigning one-click commands to the buttons. Three-year warranty.

GST Ex: \$118 + GST: \$11.80
(54912) GST Inc: **\$129.⁸⁰**

SOUNDMAN X2 SPEAKERS

- High performance subwoofer and satellite speaker system
- Crisp clear highs and deep rich bass
- Theater-quality sound for CD music, Internet and games
- Total output power: 40 watts RMS, 320 watts PMPO
- 3-year warranty



GST Ex: \$162
+ GST: \$16.20
(84808)
GST Inc: **\$178.²⁰**

CORDLESS MOUSEMAN WHEEL



Cordless MouseMan Wheel combines cordless freedom of movement and a comfortable shape with unique soft-touch sides, an easy-scrolling wheel and four customizable buttons. It eliminates the struggle with cords, works without being pointed at the computer and performs on crowded desks. Five-year warranty.

GST Ex: \$90 + GST: \$9.00
(78677) GST Inc: **\$99.⁰⁰**

NEW LOW PRICE

Mini Wheel Mouse
(97717)
GST Ex: \$67
+ GST: \$6.70
GST Inc:
\$73.⁷⁰



Marble Mouse
(A1905)
GST Ex: \$64
+ GST: \$6.40
GST Inc:
\$70.⁴⁰



TrackMan Live
(77753)
Cordless freedom for more interactive presentations, works up to 10 metres away from the computer.

GST Ex: \$239
+ GST: \$23.90
GST Inc:
\$262.⁹⁰



ServerLink to computer cable

Each end of the cable fans out into three connectors. 2m cable for PS/2 mouse, keyboard and monitor
GST Ex \$26 + GST \$2.60 (63972)

\$28.60
GST INC

5m cable
GST Ex \$58 + GST \$5.80 (63976)

\$63.80
GST INC

2m cable for AT/Serial mouse, keyboard and monitor
GST Ex \$25 + GST \$2.50 (63974)

\$27.50
GST INC

5m cable
GST Ex \$56 + GST \$5.60 (63977)

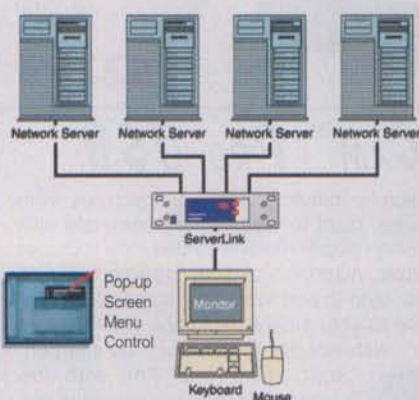
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GST INC



Multi-Server Controllers

Control up to 256 network servers with a single monitor, keyboard & mouse

With a ServerLink KVM switch you can monitor and fully control up to 256 network servers with just one monitor, keyboard and mouse. Save money on expensive monitors, create more working space and cut down on your power costs.



Designed and manufactured in Australia by an award winning engineering company, ServerLink is packed with features, providing total control of your ever expanding network.

- Select servers via On-Screen-Display or Front Panel
- Name servers for simple selection
- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic server monitoring
- Standard cables used throughout
- Cascadeable to control up to 256 servers
- 8 and 16 port models 19 inch rack mounted design
- Australian designed and manufactured

FROM **\$349.80**



ServerLink™

- EPROM upgradeable for future technology
- Supports PS/2 and Serial mouse emulation



SL-401E	4 Port ServerLink Controller for PS/2 only	GST Ex \$318 + GST \$31.80 (71652) GST INC \$349.80
SL-401	4 Port ServerLink Controller	GST Ex \$670 + GST \$67.00 (63724) GST INC \$737.00
SL-801	8 Port ServerLink Controller	GST Ex \$1,119 + GST \$111.90 (63777) GST INC \$1,230.90
SL-1601	16 Port ServerLink Controller	GST Ex \$1,881 + GST \$188.10 (63778) GST INC \$2,069.10

Wine on-line?



SERVERLINK INFINITY

PS-2 ONLY

- Password protection for security
- Flash ROM upgradeable for future technology



SL-821	8 Port ServerLink Infinity controller	GST Ex \$974 + GST \$97.40 (97888) GST INC \$1,071.40
SL-821-P	8 Port ServerLink Infinity controller incl 8x2m Cables	GST Ex \$1,131 + GST \$113.10 (97889) GST INC \$1,244.10
SL-1621	16 Port ServerLink Infinity controller	GST Ex \$1,633 + GST \$163.30 (97890) GST INC \$1,796.30
SL-1621-P	16 Port ServerLink Infinity controller incl 16x2m Cables	GST Ex \$1,934 + GST \$193.40 (97891) GST INC \$2,127.40

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Taking Pictures Further

Kodak DC5000

Rugged, durable, and easy-to-use, the KODAK DC5000 will help you get the job done. Whether you're in the construction industry, insurance, or an outdoor enthusiast, the DC5000's weatherproof body will hold up under the toughest circumstances. Two-megapixel resolution provides you with excellent picture quality even on 8" x 10" prints. The 2X optical (30 - 60 mm) and 3X digital zoom let you choose wide angle or telephoto to take pictures in a variety of open spaces. All in all, a practical, intuitive package that is as easy to use as a point and shoot, but tough on the job



GST Ex: \$Call + GST: \$Call

(xxxxx) GST Inc: **\$Call**

Kodak PalmPix

- Compatible with Palm III, IIx, IIe, VII, IBM Workpad and TRGPro.
- Portable: Take it everywhere
- Quick- take a picture, transfer by HotSync technology, and share it in seconds
- Color VGA Pictures- 640x480 pixel resolution.
- Zoom- 2x digital zoom
- Windows 95, 98, nT 4.0 or later compatible



GST Ex: \$281 + GST: \$28.10

(A2310) GST Inc: **\$309.¹⁰**

Kodak DC280

Fast, responsive and sophisticated, the KODAK DC280 means business. Its intuitive design and responsive performance mean there's little learning curve. The DC280 lets you capture business images quickly and professionally. And then put them to work immediately.



- 2 Million Pixel Resolution
- 2x Optical and 3x Digital Zoom Lens
- USB compatible
- 8MB Picture Card
- Photodeluxe Pagemill and Photoprinter Software
- Rechargeable batteries and charger included

GST Ex: \$846 + GST: \$84.60

(80361) GST Inc: **\$930.⁶⁰**

Kodak DC290

The model of choice for high-end business picture takers. It gives you the ultimate in digital control thanks to its ability to "learn" scripts and applications—much like you'd customize your PC with different software.



- 2.1 Million Pixel Resolution
- Up to 3.3 Million Pixel Interpolated Resolution
- 3x Optical and 2x Digital Zoom
- JPEG and Uncompressed TIFF File Format
- Audio record and playback
- Burst capture mode
- 16MB Picture Card
- Rechargeable batteries/charger included

GST Ex: \$1,228 + GST: \$122.80

(84735) GST Inc: **\$1,350.⁸⁰**

Kodak DC215 Zoom

It's a snap to use, thanks to the award-winning interface and controls. And we've packed all this functionality into a silver metal-skinned design, among the most compact on the market.



- 1 Million pixel resolution
- 2x wide angle (29-58mm) optical glass zoom lens
- 4MB picture card

GST Ex: \$362 + GST: \$36.20

(80360) GST Inc: **\$398.²⁰**

Kodak DC215 Millennium

Represents outstanding value for money with USB card reader for up to 10 downloads. Stunning Gold Metal-skinned design amongst the best on the market.



- 1 Million Pixel Resolution
- 2x wide angle (29x58mm) optical glass zoom lens
- 4Mb picture card
- Photodeluxe and pagemill software
- USB card reader included

GST Ex: \$448 + GST: \$44.80

(81279) GST Inc: **\$498.²⁰**

Kodak DVC 325

The KODAK DVC325 Digital Video Camera is the easy, fun way to capture and share quality digital pictures and video

- Full motion video up to 30 frames per second
- Great 640x480 Still Images
- USB Interface
- Create videos that include text, video, audio and special effects with Presto!
- Videoworks software included
- Standard Tripod Socket



GST Ex: \$134 + GST: \$13.40

(80362) GST Inc: **\$147.⁴⁰**

Kodak 4832 External USBWriter

NEW USB, 4x CDR Write, 4x CDRW Re-Write, Up to 8x Read.

Dimensions 195(w) x 60(h) x 247(d) mm, Weight 2.53Kg. USB supported by Windows 98. PACKAGE CONTENTS- Your Kodak USB CD-R/RW drive, Recording Software CD and CD-R/RW drive Driver CD, USB connection cable, Power cable with universal power supply, KODAK Ultima CDR, KODAK 4832e User Manual.



GST Ex: \$Call + GST: \$Call

(xxxxx) GST Inc: **\$Call**

Kodak Accessories

32MB

Picture Card

(62677)

GST Ex: \$156

+ GST: \$15.60

GST Inc:

\$171.60

64MB

Picture Card

(82249)

GST Ex: \$241

+ GST: \$24.10

GST Inc:

\$265.10

96MB

Picture Card

(88332)

GST Ex: \$369

+ GST: \$36.90

GST Inc:

\$405.90

Premium Camera Bag

(82273)

GST Ex: \$53

+ GST: \$5.30

GST Inc:

\$58.30

80 Minute Ultima

(94493)

GST Ex: \$2

+ GST: \$0.20

GST Inc:

\$2.20

Kodak Gold 10 Pack

(53993)

GST Ex: \$21

+ GST: \$2.10

GST Inc:

\$23.10

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+ GST: \$1.80
GST Inc:

\$19.80



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(79584)
GST Ex: \$25
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GST Inc:

\$27.50

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Vertical in-ear stereo headphone with adjustable microphone boom. Ideal for notebook users. Designed for multimedia convenience. Lightweight and compact, adjustable headband. (Must be powered by a soundcard) (77819)
GST Ex: \$17
+ GST: \$1.70
GST Inc:

\$18.70

Writable:(CD-R)



74 min.
650MB
Single
GST Ex: \$2 +
GST: \$0.20
(74740)
GST Inc:
\$2.20

Verbatim DataLifePlus® discs have an extra durable, printable surface.



74 min. 650MB
10 Pack
GST Ex: \$16 +
GST: \$1.60
(76731) GST Inc:
\$17.60



80 min.
700MB Single
GST Ex: \$2 +
GST: \$0.20
(87392)
GST Inc:
\$2.20



DataLifePlus® Envelope

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+ GST: \$1.90
(99682) GST Inc: **\$20.90**

ReWritable: (CD-RW)



74min. 650MB
2x/4x Speed Single
GST Ex: \$6
+ GST: \$0.60
(77492) GST Inc: **\$6.60**

74 Min MusicLifePlus CD-R Audio



Designed for use with Home Audio CD Recorders. Read Compatible with all CD Audio players.
GST Ex: \$3.00 + GST: \$0.30
(A2336) GST Inc: **\$3.30**



74 Min MiniDisc for Music

Box of 5 recordable MiniDisc's for use in MiniDisc players.
GST Ex: \$30 + GST: \$3.00
(A2337) GST Inc: **\$33.00**

Verbatim Signature III Colour CD



Printer The Signature III Colour CD Printer is a new, third generation ink-jet CD Colour printer from industry leader Primera Technology. It combines the fastest print speed ever offered with the highest print resolution available in the world today: 1200x1200dpi for a stunning 1.44 million pixels per square inch.
GST Ex: \$2,459 + GST: \$245.90 (89186)
GST Inc: **\$2,704.90**

Also available, the Champion Comet is the first economical, desktop printer loader designed for the Signature II and III printers. The loader stacks up to 50 printable discs, then after printing, the discs are deposited into the output tray.

Comet Autoloader for Signature Printers

GST Ex: \$2,411 + GST: \$241.10 (97769) GST Inc: **\$2,652.10**

Verbatim CopySmart 4x4x32 CD Duplicator



Stand-alone or PC connected one-to-one duplicator able to record to both CD-R and CD-RW media. 4x CD-R, 4x CD-RW copy functions. Simple 4 button interface allowing Speed selection, Test, Copy, Compare and Quick Erase. PC based Data and Audio copying Software included.

4x Write, 4x ReWrite, 32x Read



GST Ex: \$1,520 + GST: \$152.00 (92173)
GST Inc: **\$1,672.00**

Verbatim Slim-line PC Card CD-ROM Drive



Add a CD-ROM to your Laptop!

This 24xCD-ROM can connect to any PC Card enabled PC or Notebook and is ideal for mobile computing for notebook users with no CD-Rom drive built-in. The drive is plug-and-play making installation a breeze and the slim-line tray reduces the size of traditional external

GST Ex: \$287 + GST: \$28.70 (97766)
GST Inc: **\$215.70**

Verbatim 56K Compact Modem



Compatible with Windows® CE based Palm PCs & Handheld PCs

The Pretec CompactModem from Verbatim is the world's first and smallest 56kbps Fax/Modem card for Windows CE based Palm PCs and handheld PCs. Video conferencing ready. Supports V.80 application for synchronous H.324 streaming. Supports V.90 and K56flex. Win 95/98/NT /CE compatible. By connecting the CompactFlash adapter included, this modem also becomes a fully-fledged PC card able to be used with most laptops/notebooks.

GST Ex: \$255 + GST: \$25.50 (83607)
GST Inc: **\$280.50**

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Web
Directwww.ht.com.au/cat/optistor**Camera's, CD-R/W and CD/DVD Tower****Axis Network Cameras**

If a picture says a thousand words then an Axis network camera can speak volumes.

Axis 200+ Network Camera

The 200+ is a low frame rate network camera that can connect to an Ethernet LAN or dial-up modem telephone line and send a new image at specified intervals via Internet Protocols to your web site, an email box, network server or simply viewed using a web browser. Axis 200+ cameras are in use on ski fields, railway stations, beaches, city views, kindergartens, zoos and more locations than can be listed. Axis 200+ cameras make the associated web sites interesting, up to date and exciting. The 200+ supports a range of third party lenses and provides video control signals to control auto-iris lenses, which are essential on any digital camera that is used outdoors or in bright light.

GST Ex \$1,687 + GST \$168.70 (47582) GST INC **\$1,855.⁷⁰****Axis 2100**

Like the 200+, the 2100 produces exciting clear images and transmits them over the network. Its state-of-the-art technology and embedded Linux operating system gives it the ability to transmit jpeg images at 10 frames per second. The 2100 is designed for indoor use and features a stylish plastic case and easy setup wizards. As an indoor camera the 2100 dispenses with unnecessary auto-iris video control signals in favour of lower price.

GST Ex \$1,018 + GST \$101.80 (97648) GST INC **\$1,119.⁸⁰****AXIS**
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PlexWriter 12/4/32

CD-Rewritable SCSI Drive

12X CD-Write, 4X CD-Rewrite, 32X max CD-Read

The PlexWriter 12/4/32 combines Plextor's proven reliability with the most exceptional record, rewrite and playback capabilities available. While achieving CD-Recording at blazing 12X speeds, the PlexWriter 12/4/32 maintains the highest quality and stability while creating a 650MB disc in just 6 minutes. Fast 160ms average random access time and burst transfer rates of 20MB/sec make this drive a top performer. With 32X max read, the PlexWriter 12/4/32 qualifies as a full-time replacement of your existing CD-ROM or CD-R Drive.

GST Ex \$790 + GST \$79.00 (99620) GST INC **\$869.⁰⁰** INTERNAL**Wine on-line?**

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Optistor CD/DVD Caching Tower

The Optistor CD/DVD caching tower features the Axis CDE100 CD-ROM Server giving support for hard disc caching for up to 100 CD's. Great news for organizations that require fast access to information stored on CDs and DVDs!

The towers are available with 1, 5 or 6 DVD ROM drives and hard drive storage capacity for 25, 50 or 100 full CD's. All towers are fully compatible with NetWare, Windows 95/98 and NT, Mac and TCP/IP, allowing users to access CDs and DVDs simultaneously over the network.

Installation is easy. The Optistor CD/DVD Caching Tower plugs directly into a LAN or WAN via Ethernet or Fast Ethernet in under 5 minutes without bringing down the server network. Add this to the ease of use, fast access to CD's and DVD's and remote administration and you have a complete solution in a box.

5 CD/DVD drive holds 100 discsGST Ex \$7,582 + GST \$758.20 (99600) GST INC **\$8,340.²⁰****6 CD/DVD drive holds 27 discs**GST Ex \$4,582 + GST \$458.20 (99602) GST INC **\$5,040.²⁰****6 CD/DVD drive holds 50 discs**GST Ex \$5,748 + GST \$574.80 (99605) GST INC **\$6,322.⁸⁰****Fly Buys.**

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The amazing VAIO from Sony! VAIO WORLD is a world of possibility where digital products interact seamlessly. Bringing together audio and video, computing and communications. To win the ultimate laptop simply purchase specially marked boxes of CDR and Floppy disk or Sony DDS cartridges during August and November and you can be in the running to win one of 5 VAIO Laptops.



Sony CDR

Sony 74Min 650Mb
CD-R Blank Media
10 Pack (26680)
GST Ex \$17 + GST
\$1.70 GST INC

\$18.70

CRX140EBK CD-R/RW kit

8x write, 4x rewrite, 32x read

This IDE interface drive ships complete with everything you need to get started. Includes interface and audio cables, mounting screws, Adaptec CD Creator V4 (Win 2K compat.) & CD Direct V3 s/w installation and user manuals PLUS one CD-R and one CD-RW disk.

GST Ex \$418 + GST \$41.80

(88568) GST INC

\$459.80



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The Multiscan N50 15 LCD
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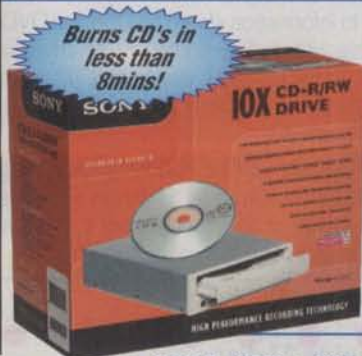
www.sony.com.au it's a Sony

GST Ex \$2,531
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(97422) GST INC

\$2,784.10

CD-RW Drive CRX145SBK MAX Performance CD-RW Kit

The CRX145 offers MAXimum performance speed with the latest 10X recording technology, 32X playback and 4X RW. This high performance drive features SCSI interfacing and custom Sony Laser technology. A large 4MB buffer and special 4X audio mode combine for accelerated recording and anti-skip playback. Supplied as a kit with everything* required for installation & operation including cables, media, Adaptec CD Creator V4 (Win 2K compatible!) & DirectCD V3 s/w. New Preformatted media saves up to an hour in set up time.



GST Ex \$523 + GST \$52.30

(97411) GST INC

\$575.30

IDE version
GST Ex \$497
+ GST \$49.70 (97409)
GST INC **\$546.70**

Preformatted
media saves
up to 40mins
set-up time!



* SCSI Host Adapter card not included.

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Sony CyberShot DSC-S30

Memory Stick Digital Camera 1.3 Megapixel resolution (1.6 megapixel interpolated) 6x Precision Digital zoom (3x Optical zoom) 2" Colour LCD monitor, Interlace Scan Super HAD CCD InfoLITHIUM M series battery 12bit A/D conversion Super Resolution Converter Automatic Focus Automatic/Priority Aperture Automatic/Priority Shutter Auto/Manual/Preset White Balance Exposure control



GST Ex \$1,060 + GST \$106.00
(99849) GST INC

\$1,070.⁶⁰

Sony CyberShot DSC-S70

Memory Stick Digital Camera 3.3 Megapixel resolution, 6x Precision Digital zoom (3x Optical zoom), 2" Colour LCD monitor, Super HAD CCD InfoLITHIUM M series battery, MPEG Movie function, Auto Focus, Auto/Priority Aperture, Auto/Priority Shutter, Sharpness control Spot Metering Automatic Photo Orientation (Portrait/Landscape) Built-in flash, red-eye reduction, External Flash socket, On-Screen Display, video/audio out, USB In/Out, Self Timer function Date/Time Stamp function Windows and Mac compatible



GST Ex \$1,707 + GST \$170.70
(99850) GST INC

\$1,877.⁷⁰

MSAC-US1 Memory Stick USB Adapter

- USB Interface Windows 98 compatible
- Macintosh compatible (MacOS 8.5.1 or newer) • Operating Voltage: 4.75 - 5.25V (bus powered) • Dimensions (WxHxD): 68x89x25mm • Weight: 70g



GST Ex \$142 + GST \$14.20

(97398) GST INC **\$156.20**

Assorted Memory Sticks

8MB Memory Stick

GST Ex \$67 + GST \$6.70 (88647) GST INC **\$73.⁷⁰**

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32MB Memory Stick

GST Ex \$145 + GST \$14.50 (88654) GST INC **\$159.⁵⁰**

64MB Memory Stick

GST Ex \$254 + GST \$25.40 (88648) GST INC **\$279.⁴⁰**

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Sony Digital Mavica MVCFD73

Floppy Disk Digital Camera

- 10x Optical zoom • 2.5" Colour LCD monitor Progressive Scan CCD • InfoLITHIUM L series battery • Automatic Focus • Automatic White Balance • Exposure control • Built-in intelligent flash • Standard/Fine compression modes • On-Screen Display • Backlight on/off switch • Index playback • 10 second Self Timer function • Date/Time Stamp function



GST Ex \$869 + GST \$86.90
(75794) GST INC

\$955.⁹⁰

Sony Digital Mavica MVCFD85

Floppy Disk Digital Camera

- 6x Precision Digital zoom (3x Optical zoom) • 2.5" Colour LCD monitor with solar illumination feature • Interlace Scan Super HAD CCD • InfoLITHIUM L series battery • 12bit A/D conversion • Super Resolution Converter • AQ compression • MPEG Movie function • High Speed Automatic Focus • Automatic/Manual/ Preset White Balance • Exposure control • Sharpness control



GST Ex \$1,352 + GST \$135.20
(A0814) GST INC

\$1,487.²⁰

Sony Digital Mavica MVCFD90

Floppy Disk Digital Camera

- Removable 3.5" 2HD floppy disk storage media • 1.3 mega pixel CCD interlace • SXGA (1280x960), XGA (1024x768), VGA (640x480 pixel) resolution • Up to 30 images per 1.44MB floppy disc/1,272 per 64MB memory stick with optional MSACFD2M adaptor • 2.5" colour LCD • 560g • Voice Memo mode (up to 40 secs).



GST Ex \$1,588 + GST \$158.80
(A0801) GST INC

\$1,745.⁸⁰

Sony Digital Mavica MVCFD95

Floppy Disk Digital Camera

- 20x Precision Digital zoom (10x Optical zoom) • 2.5" Colour LCD monitor • Automatic Colour Electronic Viewfinder • Interlace Scan Super HAD CCD • Optical Super Steady Shot • InfoLITHIUM L series battery • 12bit A/D conversion • Super Resolution Converter • AQ compression • MPEG Movie function • Automatic/Manual Focus • Automatic/Manual/ Preset White Balance



GST Ex \$2,078 + GST \$207.80
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accelerator card**
(35145)
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**Zip ISA SCSI Zoom
accelerator card**
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(31823)
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(46305)
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(48059)
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\$0.40 GST Inc: **\$4.40**

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(35146)
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GST Ex: \$144 + GST:
\$14.40 GST Inc: **\$158.40**

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(32844)
GST Ex: \$374 + GST:
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Jaz PCMCIA SCSI card
(44744)
GST Ex: \$193
+ GST: \$19.30
GST Inc: **\$212.30**

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supply**
(35154)
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\$5.60 GST Inc: **\$61.60**

Click! Power Supply
(78925)
GST Ex: \$29
+ GST: \$2.90
GST Inc: **\$31.90**

Zip 250MB

Provides high-capacity storage in an easy-to-use format that can go from desktop to laptop quickly and reliably. Sleek new design. Connect via USB port or through PCMCIA card version which requires no additional power cables. Backward compatible with 100MB Zip media



ZIP 250MB USB:

GST Ex: \$334 + GST: \$33.40 (82633) GST Inc: **\$367.40**

Drive USB/PC card Combo

GST Ex: \$366 + GST: \$36.60 (82780) GST Inc: **\$402.60**

ZIP USB

Zip 250MB

Comes with 1 Zip 250MB disk. Iomega tools supplied on CD.

SCSI: GST Ex: \$303 + GST: \$30.30

(74451) GST Inc: **\$333.30**

Disks: Single: GST Ex: \$21 + GST: \$2.10

(74454) GST Inc: **\$23.10**

Disks: 10-pack: GST Ex: \$190 + GST: \$19.00

(74452) GST Inc: **\$209.00**

ZIP 250



Jaz 2GB External

GST Ex: \$545 GST: \$54.50

(78941) GST Inc: **\$599.50**

The external Jaz 2GB drive is faster than many hard drives, has a full 2GB of storage space in each removable disk.

Disk Single:

GST Ex: \$152 + GST: \$15.20 (61652)

GST Inc: **\$167.20**

Disk 3-pack:

GST Ex: \$416 + GST: \$41.60 (57271) GST Inc: **\$457.60**

Jaz Firewire dongle: SCSI to USB connector

COMING SOON!!

JAZ

Does not include
Jaz disk.

Zip 100MB

USB Starter kit

USB Easy to connect. Comes with 3 disks. Plug it in, connect the USB cable to the computer, and install the IomegaWare™ software. Done!

GST Ex: \$2471 + GST: \$24.70 (A2308) GST Inc: **\$271.70**

NEW

CD-RW External
4 X 4 X 6

The ZipCD™ external USB drive reads, writes and rewrites most CD formats. You can use it to record, back up, and share your files.

- It's portable and hot-swappable, letting you connect it to all USB-enabled computers without rebooting.

- It enables you to record and erase ZipCD™ discs up to 1000 times.

- Enable PC and Macintosh® computer users to record, archive, share, and distribute up to 650MB of data on a common CD format.



GST Ex: \$482 + GST: \$48.20

(92623) GST Inc: **\$530.20**

ZIPCD USB

CD-RW Internal
8 X 4 X 32

Store your personal photos, original audio and video creations, multimedia presentations and data files. Backup your files & save space on your hard drive.

GST Ex: \$490 GST: \$49.00

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ZIPCD



PC Card Drive

Removable solution for notebook users. Store, protect and share important information on a 40MB Click! (1 disk included).

Click! USB docking station

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GST Inc: **\$119.90**

Click! Drive PC Card and disk

GST Ex: \$239 + GST: \$23.90 (78902) GST Inc: **\$262.90**

Click! Drive Mobile

GST Ex: \$313 + GST: \$31.30 (76743) GST Inc: **\$344.30**

Click! Disks 10-pack

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Next Generation Backup Solutions

MaxAttach NAS System



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Simplest way to add file services to any NT or Unix Network.

MaxA40: 40Gb

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(A2201) GST INC **\$3,058.00**

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(A2204) GST INC **\$4,301.00**

MaxC160: 160Gb

GST Ex \$5,530 + GST \$553.00

(A2205) GST INC **\$6,083.00**



- Simply plug into your ethernet
- Only 5 mouse clicks to install....
- In 10 minutes you have 40, 80 or 160Gb of disk storage on line.
- Simple Web Browser administration.
- No NT licenses to buy!
- 95/98NT and Unix network compatible
- Now in 1 RU high models (4.5 cm high)
- Disk Spanning, JBOD or Raid level 1 built-in
- Free Reflect-It software to automatically backup you laptops or PCs.

Backup Software - TapeWare

TapeWare Lite: Single Server backup for NT, Netware or Linux



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(97849) GST INC **\$467.50**

TapeWare - Loaded with features yet simple to use. TapeWare is simple to install and easy to administer whether you have a single PC or a large enterprise network.

- Quick Start Wizards set up most common applications quickly
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- Built in free 6 slot autoloader support
- Desktop, Single Server, Enterprise and Data Centre Versions
- Options for MS-Exchange, Cluster, SQL, SAN etc

Tandberg SLR Tape Drives



NEW!

"Designed for price performance and superior reliability"

SLR40 (Internal)

- 20Gb native, 40 compressed
- 3-6Mb sec, 21 Gb/hour

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(A2313) GST INC **\$2,746.70**

SLR60 (Internal)

- 30Gb native, 60 compressed
- 4-8Mb sec, 28 Gb/hour

GST Ex \$2,870 + GST \$287.00

(A2206) GST INC **\$3,157.00**

SLR100 (Internal)

- 50Gb native, 100Gb compressed
- 5-10Mb sec, 36 Gb/hour

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(A2207) GST INC **\$5,304.20**

ECRIX VXA-1 Tape Drive

INTERNAL GST Ex \$1,558 + GST

\$155.80 (91106) GST INC

\$1,713.80

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\$164.90 (91110) GST INC

\$1,813.90



- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hr
- SCSI-2 and LVD models available.
- Variable speed operation matches data throughput to your computer
- Packet based technology guarantees reliable restores
- LINUX approved
- Variety of case colours (*White, black, red, translucent)
- Compatible with most backup software

Benchmark DLT1 Tape Drive



INTERNAL
GST Ex \$2,915

+ GST \$291.50 (88037)

GST INC **\$3,206.50**

EXTERNAL GST Ex

\$3,125 + GST \$312.50

(88038) GST INC

\$3,437.50

- 40GB native, 80GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- Ultra Wide SCSI LVD interface
- Reads DLT4000 tapes (20/40Gb Only)
- Internal or External models
- LINUX Approved
- 7 tape autoloader available
- Compatible with most common backup software
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Overland DLT1 Based Autoloader



NEW!

"Lowest Cost DLT compatible Autoloader on the market"

- 400 Gb native, 800 Gb compressed capacity
- DLT1 Single Tape Drive included
- 10 tape capacity
- Overland DLT reliability
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- Includes 1 data tape and cable
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GST Ex \$7184
+ GST \$718.40
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GST INC
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+ GST \$7.30
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GST INC
\$80.30

DLT4000 20/
80GB Tape
GST EX \$128
+ GST \$12.80
(71231)
GST INC
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GST INC
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(70948)
GST INC
\$39.60

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GST INC

\$184.80

The EPSON STYLUS COLOR 480 brings the quality and performance of our PerfectPicture Imaging System within everyone's reach. It offers the fine-grained detail of Ultra Micro Dot printing, and the speed and beauty of Variable-Sized Droplet technology. With its user-friendly on-screen display, you control all printer functions right from your PC! Exclusive to Windows only.

EPSON STYLUS PHOTO 720



Resolution:
1440 x 720 dpi

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(A0471)
GST INC

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The EPSON STYLUS PHOTO 720's high-quality, 6-colour printing ensures superior results on everything from documents to greeting cards, photo stickers and t-shirt transfers. Combining the superior performance of EPSON's PPIS and 1440 dpi resolution, this new printer offers high image quality for the home and small business user. It also features 7 picolitre Ultra Micro Dots to deliver dazzling details superb image quality.

EPSON STYLUS COLOR 760



GST Ex \$390
+ GST \$39.00
(A1451)
GST INC **\$429.00**

The new EPSON STYLUS COLOR 760 incorporates the latest state-of-the-art technology to ensure it is right at home meeting the demands of the advanced home and office user. By combining EPSON's Advanced Variable-Sized Droplet technology and Ultra Micro Dots with EPSON's award winning PerfectPicture Imaging System, the EPSON STYLUS COLOR 760 has created a new standard of image quality for the SOHO environment. Produces images that are so fine-grained, they are virtually indistinguishable from photographs.

* Offer valid until 31-07-00

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Double Black Cartridges available for the following printers...

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Stylus Color 400, 500, 600

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GST Ex \$70 + GST \$7.00 (90627) GST INC **\$77.00**

Stylus Color 440, 460, 640, Photo1160

GST Ex \$61 + GST \$6.10 (90626) GST INC **\$67.10**

Stylus Color 670, 740, 760, 860, 1160

GST Ex \$70 + GST \$7.00 (90625) GST INC **\$77.00**

Stylus Color 400, 800, 800+, 1000

GST Ex \$46 + GST \$4.30 (28179) GST INC **\$47.30**

We don't have double packs for the 900 or Photo 1270 cartridges only the black cartridge for the Stylus Photo 720.

Epson Model	480	720	760
Print Method	Piezoelectric	Piezoelectric	Piezoelectric
Print Speed Colour (econ mode)	2.6ppm	4.2ppm	6.8ppm
Print Speed Black (econ mode)	4ppm	4.3ppm	7ppm
Print Resolution	720x720	1440x720	1440x720
Paper holding capacity			
Plain 100 shts	100 sheets	100 sheets	100 sheets
Epson Transparency	1 sheet	30 sheets	20 sheets
Envelopes	10 env	10 env	10 env

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(94499) GST INC

\$244⁻²⁰

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- 1440 dpi
- Separate replacement colours

A3/A4 BJC- 6500

GST Ex \$563 +
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(95962) GST INC

\$619⁻³⁰

LBP1000

10 pages per minute print engine at 1200 dpi resolution. Energy saving 'On-Demand' toner fusing. Cost-saving 'economy' printing mode. Powerful processor to ensure maximum throughput. Memory Saving Technology to accomplish more in less RAM. PCL6 Print Language emulation. Optional genuine Adobe® PostScript® 3™ printer language. Optional second 250 sheet paper feeder. Maintenance free 'all-in-one' toner and drum cartridge. 4 MB RAM standard - upgradeable to 36 MB.



GST Ex \$1,053 + GST \$105.30

(95983) GST INC **\$1,158⁻³⁰**

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BJC-1000SP

Super Economy Mode in black & white & colour. Vivid colours, on plain paper. Photo Mode colour, optional PhotoRealism. Auto image improvement. Print banners up to 6 A4 pages, envelopes, transparencies, glossy photo paper, high gloss film & T-shirt transfers.



GST Ex \$136 + GST \$13.60
(A1792) GST INC

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BJC-2000SP

Super Economy mode: 3,600 black text pages. Prints up to 5 ppm for black text and up to 2ppm for colour. Photo mode on plain paper. Optional PhotoRealism photo printing. Banner printing capable. Optional colour scanner head.



GST Ex \$144 + GST \$14.40
(80926) GST INC

\$158⁻⁴⁰

BJC-8200

Photographic printing quality 1200 x 1200 dpi, PhotoRealism 6 colour printing, Separate ink tanks for each colour with level detection system, Optional scanning at 600 dpi, Parallel connectivity for Win® 95/98 & NT 4.0 USB connectivity for pre-installed Windows.



GST Ex \$566 + GST \$56.60
(95964) GST INC

\$622⁻⁶⁰

LBP800

Desktop laser, 8ppm, 300x300dpi, 600x600dpi and 2,400dpi with text and line smoothing. 512K buffer. 2,500 pages per cartridge (5% cover). Win® 95, 98 and NT 4.0.



GST Ex \$468
+ GST \$46.80

(83787) GST INC

\$514⁻⁸⁰

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GST INC

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(83673) GST INC

\$179⁻³⁰

FB-630U

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opt. res. GST Ex
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\$206⁻⁸⁰

BJC-85



- Mac & Windows Multi-interface USB
- Cordless printing
- Up to 5ppm in monochrome
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- 720x360dpi
- Optional 4-colour photo printing

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(A0993) GST INC

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GST INC **\$792**

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The PSC500 provides incredible printing, scanning and copying at a great price! 1200 dpi printing on photo paper. 9600dpi enhanced scanning, 30 bit colour.



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GST INC **\$737**

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Manage your Desktop Efficiently

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Diskeeper solves the issue of degraded performance on your NT Servers and Workstations by optimising the disk file accessing mechanism. File fragmentation first strikes during the process of installing

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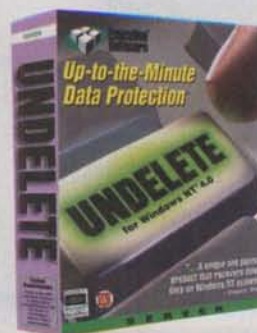
Diskeeper V5.03 Server (82944)

GST Ex \$489 + GST \$48.90 **\$537.90**

Diskeeper V5.03 Workstation (82953)

GST Ex \$99 + GST \$9.90 **\$108.90**

Undelete



Accidentally deleted files are a fact of computing life. When accidentally deleted files are not in the Recycle Bin, it makes lots of extra work for system administrators. The usual solution is to search through backup tapes until they find the lost file. This often consumes hours. Most businesses run backup at night, so work done after the latest backup is often lost and needs to be recreated. More wasted time

and lost productivity. Undelete is a complete solution for Windows NT Servers and Workstations giving a Network Administrator the ability to instantly restore deleted files. As you will see, Executive Software Undelete provides a complete, real world solution to these every day problems.

Undelete V2.0 Server (pic) (80392)

GST Ex \$490 + GST \$49 **\$539**

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HP ScanJet 3400C

Easy scanning, copying
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- 42 bit colour
- Active XPA included
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- Print any size from postcards (A6) to posters (A3+)
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(66943) **GST Inc: \$377.30**

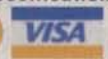
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LaserJet and InkJet Printers

HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the LJ 1100 into an all-in-one performer when your business needs grow. Crisp, sharp 600dpi laser printing. 8ppm. 2MB RAM.

GST Ex \$704 + GST \$70.40 (70095) GST INC

\$774⁻⁴⁰



HP LaserJet 1100A Printer-Copier-Scanner

If your current business needs require the LaserJet 1100 with copying & scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Make laser copies at the touch of a button. Scan resolution 600dpi enhanced, 300dpi optical.

GST Ex \$756 + GST \$75.60 (70096) GST INC **\$831⁻⁸⁰**

HP LaserJet 2100 Series

All models feature:

- 1200dpi resolution
- 10ppm print speed
- 60MHz processor
- 350-sheet capacity
- 15,000 page monthly duty cycle
- Excellent performance

LaserJet 2100

A fast flexible laser with room to grow. (72291) GST INC

\$1,321⁻¹⁰

LaserJet 2100M

A fast flexible laser with PS and PCL. (72292) GST INC

\$1,447⁻⁶⁰

LaserJet 2100TN

A complete network printer. EIO, PCL 6, (72293) GST INC 8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed.

\$1,688⁻³⁰



HP LaserJet 4050 Series

All models feature:

- 1200dpi resolution
- 16ppm print speed
- 133MHz processor
- 500-sheet capacity

LaserJet 4050 GST Ex \$1,935 + GST \$193.50 (77443) PCL 6, 8MB RAM. GST INC

\$2,128⁻⁵⁰

LaserJet 4050N GST Ex \$2,336 + GST \$233.60 (77445) PCL 6, 16MB RAM. GST INC

\$2,569⁻⁶⁰

LaserJet 4050TN GST Ex \$2,834 + GST \$283.40 (77446) PCL 6, 16MB RAM. GST INC

\$3,117⁻⁴⁰



HP Professional Colour InkJet Printers



HP 2000 Series: Business performance with break-through colour print speed. Black: 600dpi, 10 ppm. Colour: PhotoREt II, 4ppm. Low printing costs. Four individually replaceable ink cartridges. Outstanding quality. 5,000 pages monthly duty cycle. 2MB RAM.

2000C Excellent colour print quality for a great price! GST Ex \$795 + GST \$79.50 (69484) GST INC **\$874⁻⁵⁰**

2000CN Network ready, additional 250 sheet paper tray

GST Ex \$1,399 + GST \$139.90 (69485) GST INC **\$1,538⁻⁹⁰**



HP 2500 Series: Fast, brilliant colour printing for the workgroup. **A3 capable.** Black: 600dpi, 9ppm. Colour: 3.5ppm. Rugged and robust. Low cost per page. 4 individually replaceable ink cartridges. Versatile media handling. 12,000 pages monthly duty cycle.

2500C 4MB RAM GST Ex \$1,777 + GST \$177.70 (70725) GST INC **\$1,954⁻⁷⁰**

2500CM RAM GST Ex \$2,570 + GST \$257.00 (76060) GST INC **\$2,827⁻⁰⁰**

HP Colour LaserJet 4500 Series

Delivers high quality 600dpi colour graphics. 16ppm mono, 4ppm colour. 32MB RAM. 133 MHz processor. 900 pages input. Superior network management. Duplex capable. Automatic transparencies sensing. Reliable and cost-effective. Improved paper handling.

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(83652) GST INC **\$2,818.²⁰**



16ppm mono

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Standard Ethernet

MagiColor 2 DeskLaser Plus

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Turn your colour laser into a colour photocopier



Colour copying capability can be added to all Minolta-QMS Printers, with the Minolta-QMS ScanCopier 200.

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24ppm mono

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6100 A3

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18ppm B&W Printer

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Postscript 2

PagePro 18L



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Fast & Inexpensive

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Parallel Port

PagePro 1100L



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(A1438) GST INC **\$574.²⁰**

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Stunning Performance...

Phaser 740 Laser Printer



740: Affordable colour laser printer with extraordinary print quality. For breathtaking images that leap off the page, at a breakthrough colour laser price, look to the Phaser 740.

Phaser 750 Laser Printer

750: The NEW Phaser 750 brings affordable, high quality colour printing within reach of all businesses - a revolutionary idea. The Phaser 750 colour printer improves upon the award-winning Phaser 740 colour printer, with increased printing and processor speeds and improved colour quality. A new, faster 200 MHz processor delivers 16 pages per minute black-and-white prints or 5 ppm colour prints.



Tektronix Phaser 740 Toner

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GST Inc:
\$184.80

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(71855)
GST Ex: \$325
+ GST: \$32.50
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Pipeline Printing	Optional	Optional
Duplex	Standard	Standard
Manual	Standard	Standard
Auto	Optional	Optional
	(71836) GST Ex: \$3930 + GST: \$393.00 GST Inc: \$4,323.00	(A1401) GST Ex: \$4,997 + GST: \$499.70 GST Inc: \$5,496.70

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- Sync on green



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GST Ex: \$1,936
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(94489) GST Inc:
\$2,129.60



- Award Winner! Review from PC Authority April 2000 edition.
- "This was one of the top five in terms of quality and it exhibited no serious deficiencies. When discussing a 'complete' product, this is it, since it provides everything you could need in a TFT screen at a very reasonable price. Compatible with PC & Mac system and is ready for the upcoming DVI-D digital display. For multimedia users, the 150P features 2 x 1W stereo speakers, as well as a centrally-located microphone."
- PC Authority: April 2000 edition.
- Best resolution of 1024 x 768 @ 60Hz
- Sync on green



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18.1" LCD
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(80303) GST Inc:
\$7,100.50



- 18.1" LCD Monitor
- VIS: 18.1" (equiv to 19" CRT)
- MPRII/TC099 Certified
- 0.30 mm horiz pitch
- 160 degree viewing angle
- Flicker and Radiation free
- 2 built-in speakers
- Sync on green
- Best resolution 1200 x 1024 @ 60Hz



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USB PC Camera - Vesta
USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture & Videogram software. Snapshot Button for capturing still shots from the desktop. Max Resolution 640x480 @ 15fps Perfect for desktop conferencing, Internet and video mail.



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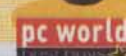
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+ GST: \$21.60
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Note: Not for Windows NT 4.0



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(A1192) GST Inc:
\$204.60



USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture, video editing & Videogram software. Max Resolution 640x480 @ 30fps. Snapshot Button for capturing still shots from the desktop. This product allows 'real time' video capture at NTSC quality with a suitable PC configuration. Perfect for desktop conferencing, Internet and video mail.



MMS280 Stereo Speakers
With Active Subwoofer

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- Plus Subwoofer System
- 480W PMPO
- Frequency Range 35-20,000 Hz
- Incredible Surround and
- Dynamic Bass Boost features



DSS350 USB Stereo
Speakers

GST Ex: \$158
+ GST: \$15.80
(72845) GST Inc:
\$173.80

Uses the USB port with Win 98/2000 PC's - no sound card required. Uses Self Oscillation Class D Amplifier Delivering 30W (RMS) 360W PMPO Line In jack for Analogue Support. Incredible Surround and Dynamic Bass Boost features.



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Speakers With Active Subwoofer

GST Ex: \$310
+ GST: \$31.00
(72847) GST Inc:
\$341.00

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CM 615 17" Monitor



GST Ex: \$461
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(97802) GST Inc:

\$507¹⁰

- ✦ 0.23mm horizontal mask pitch
- ✦ 16" Viewable image area
- ✦ 1280 x 1024 at 60Hz

CM 771 19" Flat Screen



GST Ex: \$1,117
+ GST: \$111.70
(97804) GST Inc:

\$1,228⁷⁰

- ✦ 0.22mm horizontal mask pitch
- ✦ 18" Viewable image area
- ✦ 1600 x 1200 at 75Hz

CM 811 21" Monitor



GST Ex: \$1,597
+ GST: \$159.70
(70914) GST Inc:

\$1,756⁷⁰

- ✦ 0.22mm horizontal mask pitch
- ✦ 20" Viewable image area
- ✦ 1600 x 1200 at 75Hz

CM 813 21" Performance



GST Ex: \$1,769
+ GST: \$176.90
(70915) GST Inc:

\$1,945⁹⁰

- ✦ 0.22mm horizontal mask pitch
- ✦ 20" Viewable image area
- ✦ 1856 x 1392 at 75Hz

CP-S220 LCD Projector



GST Ex: \$5,093 + GST: \$509.30

(A2272) GST Inc: **\$5,602³⁰**

- ✦ Short Throw Distance - ensures large images even in limited spaces
- ✦ Ultra-Slim Unit (only 60mm high)
- ✦ Light Weight (only 2.4kg)
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CMP 205SXU 25" Colour Plasma Display



GST Ex: \$12,681 + GST: \$1,268.10

(A2269) GST Inc: **\$13,949¹⁰**

- ✦ 0.39mm pixel pitch
- ✦ 19.6" x 15.7" effective display area
- ✦ 1280 x 1024 at 75Hz

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GST Ex: \$790 + GST: \$79.00 (A2234) GST Inc: **\$869.00**



InoculateIT 4.53 Windows NT/2000

InoculateIT is the premier antivirus solution for networked environments offering unmatched management and virus protection.

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Advanced Edition

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Workgroup/Advanced Edition 10 User:

GST Ex: \$422 + GST: \$42.20 (76152) GST Inc: **\$464.20**

Workgroup/Advanced Edition 25 User:

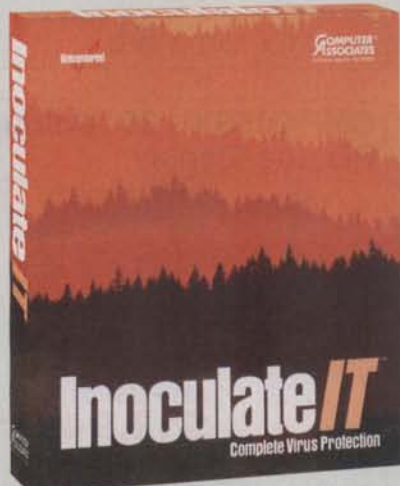
GST Ex: \$645 + GST: \$64.50 (76153) GST Inc: **\$709.50**

Workgroup/Advanced Edition 100 User:

GST Ex: \$2,087 + GST: \$208.70 (76154) GST Inc: **\$2,295.70**

Workgroup/Advanced Edition 250 User:

GST Ex: \$4,368 + GST: \$436.80 (76155) GST Inc: **\$4,804.80**



SurviveIT 4.5 Advanced Edition Windows NT

SurviveIT provides non-stop availability to mission critical servers. Data stored on a primary server is replicated in real-time to a secondary server, which can be located on a LAN or WAN. SurviveIT automatically detects critical problems with the primary server and immediately switches activity to the secondary server allowing users to continue work with virtually no interruption.

SurviveIT minimizes the effects of server downtime and ensures continuous data availability ie: access to server-based applications, such as web servers, databases and email is maintained. (90199) GST Ex: \$2,604 + GST: \$260.40 GST Inc: **\$2,864.40**

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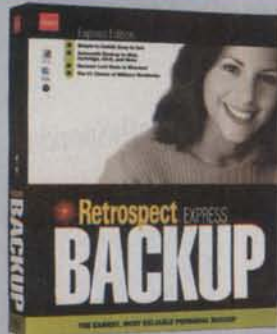
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Retrospect® Backup for Windows

Retrospect

Express Backup



The easiest,
most reliable
personal
backup

GST Ex \$109
+ GST \$10.90
(98456)
GST INC

\$119.90

Retrospect Express Backup makes it fast and easy to back up, restore, and archive. With an interface that's easy to navigate and backups that can be accomplished in a few quick steps, Retrospect Express eliminates the hassle and inefficiency of dragging files from one volume to the next. Features include:

- **Easy, automated backups:** Backups launch automatically to run unattended on any schedule.
- **Reliable one step restores:** Restores an entire hard disk in a single step even after multiple incremental backups
- **Device Support:** Simplifies Installation by immediately recognising your backup device and automatically loading the appropriate driver.
- **Compression and Encryption:** Dramatically improves storage media capacity and decreases media costs.
- **IncrementalPLUS Technology:** After the initial backup, Retrospect Express backs up only new or changed files, saving time and storage media.

Retrospect

Desktop Backup



The best
backup
software for
any storage
device

GST Ex \$340
+ GST \$34.00
(88034)
GST INC

\$374.00

Retrospect Desktop Backup is the ultimate tool for backing up a single workstation to any storage media. It combines performance, unattended operation, low administration costs, and a complete feature set within an intuitive interface. Retrospect Desktop Backup builds on the features of Retrospect Express Backup with:

- **Expanded Device Support:** Supports most tape drives/autoloaders up to 8 slots
- **Network Ready:** Adds support for another 5, 10, 50, or 100 networked computers to your copy of Retrospect Backup with Retrospect Clients
- **Compression and encryption:** Dramatically improves storage media capacity, decreases media costs. Provides security for confidential files.
- **IncrementalPLUS™ technology:** After the initial backup, Retrospect backs up only new or changed files, saving time and storage media.
- **Duplicates:** Performs immediate or scheduled copying of any local volume, network volume, or folder to any other.
- **Archiving:** Store little-used files onto media to reduce free up hard disk space.
- **Expanded Device Support:** Supports most tape drives/autoloaders up to 8 slots

Retrospect

Workgroup Backup



The best, most
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for your
workgroup and
server

GST Ex \$699
+ GST \$69.90
(88087)
GST INC

\$768.90

Retrospect Workgroup Backup provides powerful backup for your entire workgroup across the network to a single storage device. Integrate both desktop computers and notebooks who connect to the network at irregular times into the same backup schedule. Includes all the features of Retrospect Desktop Backup listed above, plus:

- **Central administration:** One person can manage all backup functions: eliminates lengthy user training and difficult installation at each workstation.
- **Backup Server™:** Determines which computers are most in need of backup and backs them up in order of priority, including notebooks.
- **Advanced security:** Prevents unauthorized access to sensitive data with password protection while retaining individual user's privacy. Encrypts network transfers for additional security.

INCLUDES THE RETROSPECT APPLICATION PLUS 20 CLIENTS

Retrospect

Server Backup



The best, most
reliable backup
for your entire
network

GST Ex \$1,069
+ GST \$106.90
(88088)
GST INC

\$1,175.90

Retrospect Server Backup includes all of the features found in Retrospect Desktop Backup and Retrospect Workgroup Backup, as well as advanced networking capabilities.

- **Powerful networking** Uses your existing network configuration to back up clients on any subnet. Includes powerful subnet broadcast and direct IP access for multi-network environments. INCLUDES THE RETROSPECT APPLICATION PLUS 100 CLIENTS

"Retrospect 5.0 Server Edition proved itself in every test... it earns a recommendation from the CRN Test Center." *Computer Reseller News*

"Dantz backup system's flexibility, easy of use should make it a winner... it might well become an overnight sensation." *PC Week*

"Retrospect has several unique technologies that differentiate it from other backup products.... an excellent package." *IT Graphics*



Retrospect Clients

Adds support for more networked computers. With the addition of cross-platform Retrospect Clients, use Retrospect to back up your whole network, including Windows 95, 98, NT 4.0 Workstation & Server, Mac and Windows 2000 computers. Back up any client-equipped computer on the network without installing file servers, starting file sharing, or mounting volumes.

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(88260)
GST INC
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GST \$46.70
(87212)

\$513.70

Dragon NaturallySpeaking Preferred 4.0



Speak at a normal pace - up to 160 words per minute and more - speech is transcribed immediately on the screen and in reports, letters, and e-mail

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GST INC **\$346.50**

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GST INC **\$201.30**

Dragon NaturallySpeaking Essentials 4.0



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(78572)

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(84840)

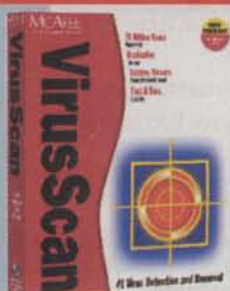
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VirusScan 5.0 Deluxe

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(A0211)

\$94.60

VirusScan 5.0



McAfee's Macro Hunter and ViruLogic technology safeguard your PC from ALL virus types and from ALL

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Personal PC Firewall



Personal Firewall offers comprehensive, proactive security for consumers' PC Internet connection. Easy to use and install, the firewall works quietly in the background,

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Internet Guard Dog V3



Allows Children to Surf & Chat Safely: Inappropriate Internet content and online chat is a concern for every parent. Internet Guard Dog software protects your

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GST Ex \$84 + GST \$8.40 (99779)

GST INC **\$92.40**

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ezimerchant professional



A substantial improvement that has benefited from the experience of ezimerchant. Ezimerchant Professional builds your online store and business through a simple point and click process. Capable of handling thousands of products ezimerchant Professional suits both small and large business.

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Easy hard drive partitioning

Drive Image Ver. 3

DriveImage is the fastest, easiest tool for complete hard drive imaging. It's robust feature set makes it the perfect solution for backups, system recovery and easy hard-drive upgrades.

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- Compresses images up to eight times faster than before.
- Wizard-driven interface
- Windows look and feel
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- Stores images across multiple Zip® and JAZ® disks
- Complete recovery from software or hardware disasters to have you back to normal in minutes.

GST EX \$120 + GST \$12.00 (A1503)

GST INC **\$132.00**

PartitionMagic V5.0

Learn the secret of hard drive partitioning with the exciting new functionality and ease of use of PartitionMagic 5.0. Dividing a hard drive into several partitions lets you efficiently organize operating systems, programs and data.

- Allows you to merge partitions
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- Support for larger drives

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GST INC **\$115.50**

SecondChance V2.0

SecondChance provides a "first-line-of-defense" for you to reverse harmful or unwanted changes to your Windows 95 or 98 system. This unique solution provides a simple and reliable way to undo the effects caused by a system crash, application conflict, user error and other system problems. By continually and automatically monitoring every change on your system, SecondChance provides you the fastest and most effective way to roll back your computer to a safe state in time, taking you back to where you want to be.

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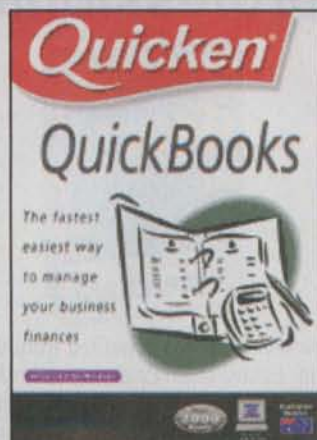
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Be sure to check all of the Quicken options available from the Web-Direct link.

We also stock Quicken's range of Personal Financial Software. Suitable for individual users.

Cross grades and upgrades are available.

QuickBooks



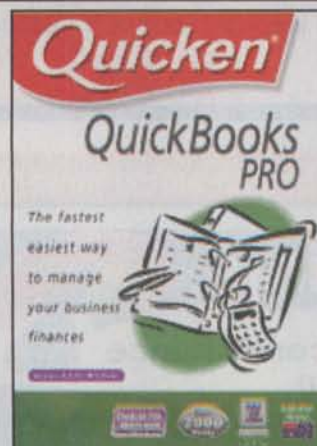
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QuickBooks PRO



With all the features of QuickBooks, QuickBooks PRO allows you to allocate staff time and material costs to a job or project. The additional time management tools, cost estimating and employee hours can flow directly on to invoices. Get an instant snapshot of your business with up to 90 financial reports and graphs.

- Advanced job costing and budgeting
- Cheque and credit card account reconciliation
- Flexible and customisable reporting
- 90 Reports and graphs
- Cheque preparation and printing
- Sales Tax calculation
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Quicken Business



Quicken for Business. And it is. The new Work Flow Manager feature sets Quicken for Business apart from the other Quicken products. This contact management tool assists in efficiently tracking and maintaining the business. Quicken For Business also contains all the features of the Standard and Deluxe versions that make Quicken the most popular financial management software available on the market today.

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Norton AntiVirus

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Essential for providing connectivity for remote and mobile users. This proven, secure comprehensive solution lets you connect to any computer anywhere and operate it as if you were there. Mobile and remote employees can quickly and easily access office-based files and applications. PcAnywhere is also the #1 choice of IT professionals worldwide for remote troubleshooting and helpdesk support. Helpdesk personnel can more quickly identify, secure and resolve user problems, without traveling to the remote machine.

Norton Ghost

Norton Ghost 6.0 is the premier tool for PC recovery, deployment, cloning, and migration. Now administrators can restore a system image onto a failed PC in as little as seven minutes, and reduce PC deployment and upgrade times by 90 percent or more. It dramatically reduces IT costs by streamlining the configuration of networked workstations

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Desktop & Server
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Desktop & Server
+ 50 licences of Norton Ghost 6.0
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About Symantec: Symantec, a world leader in Internet security technology, provides a broad range of content and network security solutions to individuals and companies. The company is a leading provider of virus protection, risk management, Internet content and e-mail filtering, and mobile code detection technologies to enterprise customers.

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TextBridge Pro Millennium quickly turns scanned files into Word files without retyping! Works seamlessly with Microsoft Office 2000 and other applications. The powerful OCR engine accurately renders documents with multiple columns and color photos for true WYSIWYG output! Create Web-ready pages automatically!

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Everything you need to get the most out of your scanner and digital camera

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Pagis Pro Millennium

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Pagis Pro Millennium offers five integrated applications in one suite, enabling customers to maximize the value of their scanners, digital cameras and electronic files.

Scan and organize electronic versions of documents and photos, turn paper documents into electronic files without retyping, quick and easy photo organizing, editing, restoration enhancements and special effects as well as options for creating unique output for print and export to the Web.

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OmniForm 4.0 is the fastest, easiest way to make your paper forms electronic

OmniForm 4.01 uses OCR and colour Logical Form Recognition™ technology to turn paper forms into great looking electronic forms with uncanny accuracy. Once scanned, use OmniForm's design tools to easily edit forms or build custom forms from scratch. To fill out forms just tab and type. OmniForm even performs spell checking and automatic calculations. Plus with new AutoFill, you can access data from other files and databases to fill forms even faster.

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- Supports HTML/Dynamic HTML
- Powerful database functions



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(A2366)

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GST INC
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Paper Converter is a must have add-on product for Microsoft® FrontPage® 2000.

Paper Converter instantly turns scanned documents into HTML-ready files you can easily publish to your company's Internet or intranet site, or your personal Web site - directly within FrontPage 2000.

With as few as 3 clicks, publish letters, contracts, resumes, technical drawings, and more. And editing Web content is as easy as editing a word processing file with the HTML format. Whether you're scanning a single page lease, multi-page contract or a document containing illustrations and charts, Paper Converter accurately renders a Web page true to the original.

Features include

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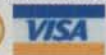
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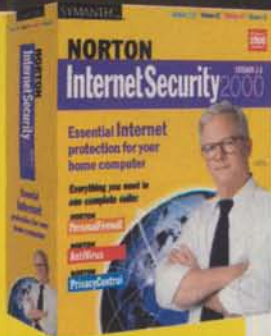
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Norton Internet Security 2000 V2.0



Norton Internet Security 2000 V2.0 is an integrated suite containing Norton AntiVirus 2000, Norton Personal Firewall 2000 & Norton Privacy Control. Norton Internet Security 2000 gives you peace of mind that your PC is secure from intrusion by hackers and your privacy is protected. Norton Internet Security provides an integrated solution—protecting you from major Internet threats in one suite. Total Internet protection for home PC users • Eliminates dangerous viruses, • Defends against malicious hackers, • Protects your privacy online **What's New and Improved?** Supports Windows NT® and Windows® 2000—Provides support for Windows NT and Windows 2000—as you adopt this latest operating system. Integrated Install—Includes a completely integrated installation—saving you time and it takes the hassle out of launching multiple install programs.

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Norton Personal Firewall gives you peace of mind that your PC is secure from intrusion by hackers and your privacy is protected. Norton Personal Firewall gives you the strong and easy to use firewall plus privacy protection features that protect your personal information from unauthorized access. Your maximum defense against hackers.

Norton Internet Security Family Edition



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(89239) GST INC
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Norton Internet Security 2000 Family Edition contains all the features of Norton Internet Security 2000 V2.0, plus also includes Norton Parental Control. Norton Internet Security 2000 Family Edition gives you peace of mind that your children are safe from harmful or inappropriate content on the Internet. It also protects your PC from hackers, privacy intrusions, and viruses. Complete Internet security solution—protecting you and your children from major Internet threats in one integrated suite. Essential Internet protection for your family's computer.

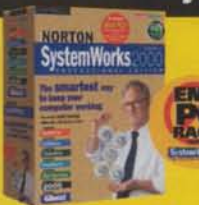
Norton AntiVirus



GST Ex \$72
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Makes downloading files off the Internet safer than ever before. • Monitors your systems in the background to prevent virus entry • Easy automatic online updates • Guaranteed satisfaction. Clear, easy to understand instructions on how to proceed when a virus is detected. **Choose the folders or directories to scan.** Scans incoming email attachments automatically. Eliminates viruses hidden in multiple compressed layers. Prompts you to run LiveUpdate when your virus definitions are out of date, and more.

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Symantec pcAnywhere



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(70659) GST INC: **\$984.50**



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- Quick Tag Editor lets you quickly view and edit source HTML at the object level without having to launch the HTML inspector

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(88049) GST INC: **\$533.50**



Fireworks 3

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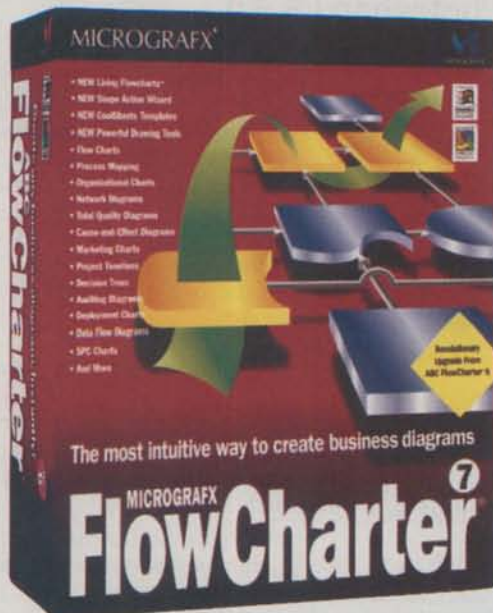


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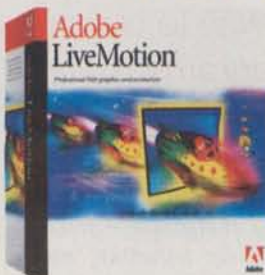
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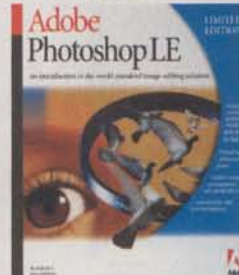


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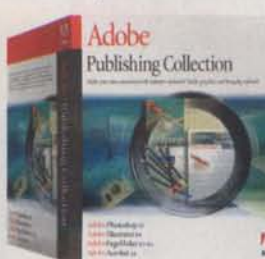


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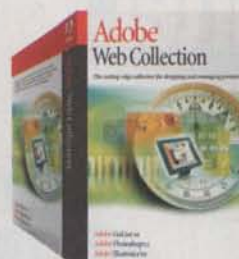


The Adobe Publishing Collection brings together four award-winning tools for creative professionals: Adobe® PageMaker® 6.5 Plus, Adobe® Photoshop®, Adobe® Illustrator®, Adobe® Acrobat®. Together these tightly integrated applications will help you create, assemble and deliver graphically rich, professional-looking communications for print and the Web.

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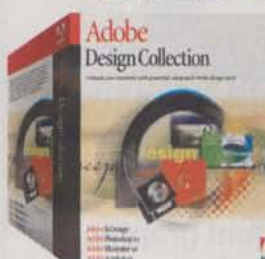


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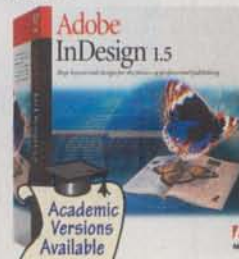


Adobe Design Collection contains the following four leading-edge design & publishing applications in one fully integrated suite: Adobe® InDesign®, Adobe® Photoshop®, Adobe® Illustrator®, Adobe® Acrobat®. Together, these programs give you everything you need to create & produce professional images, illustrations, & layouts, and to publish documents across media.

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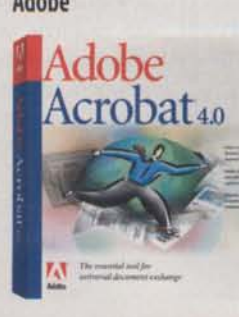


Adobe Illustrator gives you the freedom to express your creativity & the power to be more productive as you create graphically rich drawings & illustrations for printed documents, presentations, & the Web. If you need to create captivating artwork for printed documents, presentations, or the Web, count on Illustrator to let you push the limits of your creativity with top quality results every time. Explore your creativity. Boost your productivity.

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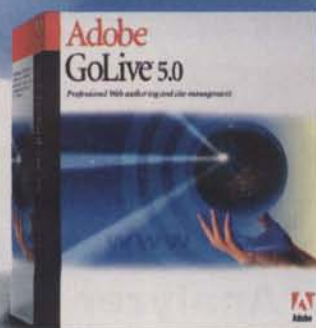


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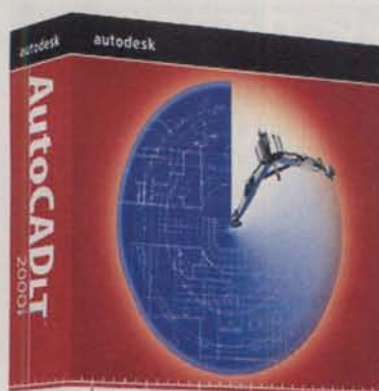
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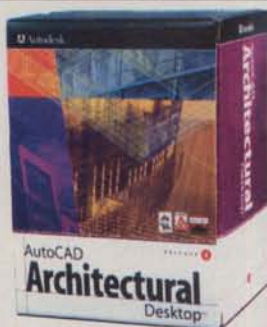
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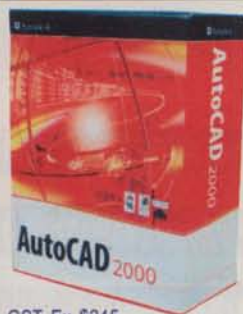
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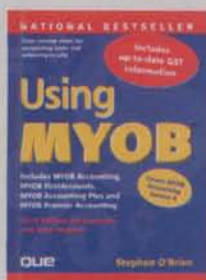


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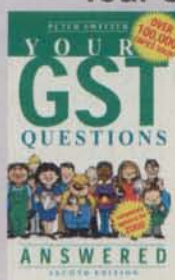
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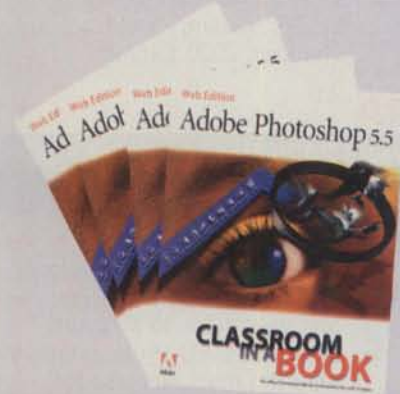
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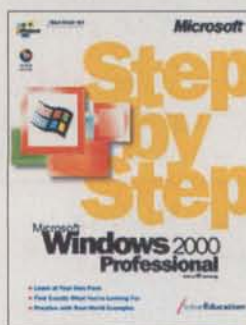


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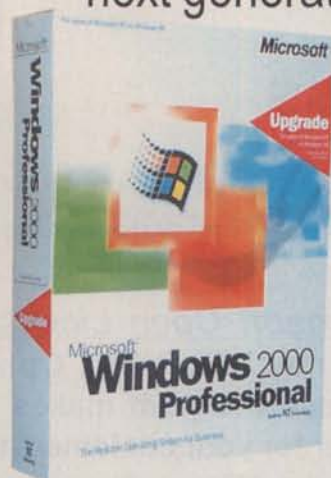
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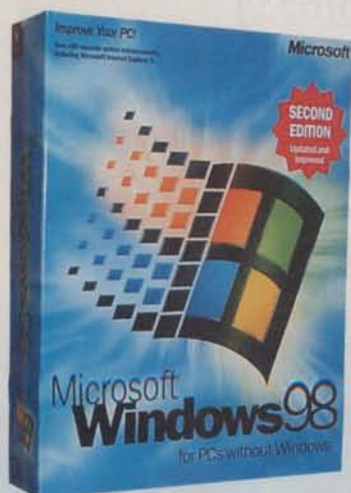
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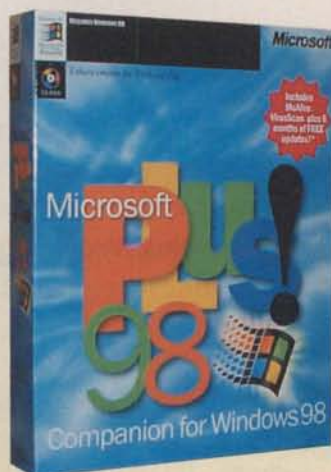
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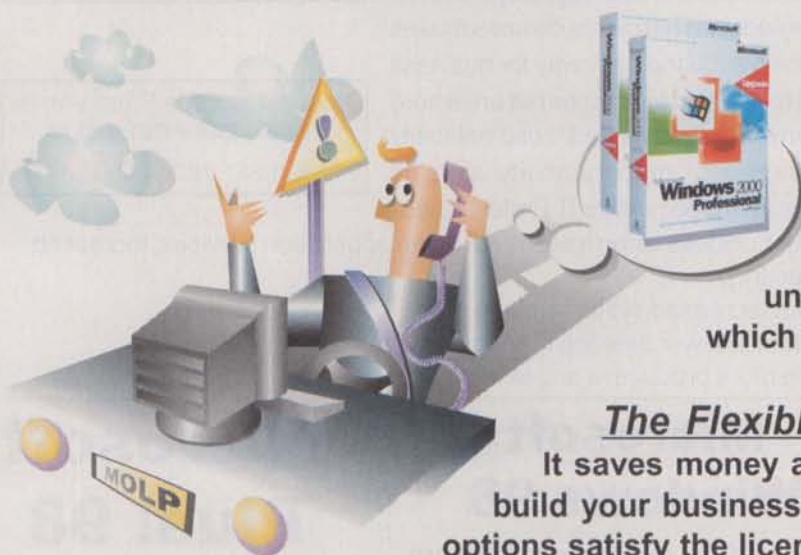
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Gunship

Gunship is a helicopter combat game that will appeal to flight simulator fans as well as lovers of fast-paced action. There are three menacing helicopter gunships that you can fly: the AH64-D Apache, the Eurocopter Tiger, and the Russian Mi-28 Havoc.

Gunship can be tailored to suit your abilities. Many elements can be adjusted, from the realism of the chopper's avionics to how much damage is needed before you bite the dust.

For those gamers wanting to jump straight into battle, there is an instant action option that provides random

flight, and it's up to you to command the other choppers.

If you need to sharpen your gunship skills, you can always put some time in at the Fort Rucker flight school. When you are fed up with the standard missions or want to let some creative juices flow, you can make use of the Gunship Battle Builder, which allows you to create your own customised missions.

Kieran McNamee

Contact	Hasbro Interactive
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Requires	Pentium 266, Windows 95, 32M RAM
Classification	G(8+)
Rating	★★★★☆

Michelin Rally Masters

Realistic rally-driving simulations are hard to come by. The rally-driving genre is stale and grossly overcrowded, but Rally Masters from Infogrames stands head and shoulders above most of its competitors. It provides a realistic driving engine and is a lot of fun to play.

Unlike most other rally games, Rally Masters has you racing against other cars. This is far more enjoyable than racing against the clock, which has become almost customary in rally games. It also

allows you to race in a one-on-one circuit, with competitors crossing tracks half way. Rally driving aficionados who have seen racing on TV will realise that this is a valuable addition.

Car handling is realistic, controls are smooth and the graphics are incredible. The scenery and tracks look amazingly lifelike, and create a real sense of speed. However, some of the car models look a little bland, and the engine and background noises are nothing special.

The multiplayer aspect of the game shines, as Rally Masters is one of the first driving games to effectively support Internet play. This is surprisingly lag free, and dedi-



objectives and enemy targets to destroy. There are also single missions that can be undertaken, or you can embark on a complete campaign.

The best thing about Gunship is that you can choose to sit in the pilot's seat and take control of the aircraft, or you can elect to be the gunner. As the gunner you can concentrate on picking off targets, and not worry about keeping the chopper in the air. As gunner you also become an all-powerful back-seat driver who can tell the pilot where to go, although the pilot does not always respond.

A successful mission requires a skilful individual performance along with carefully orchestrated manoeuvres from the entire chopper squad. Initial mission plans might need to be altered mid-



cated servers across the world ensure that there are usually people to race against.

Rally Masters is one of few games that offer a total package. The physics and car handling are near perfect, while the arresting graphics provide plenty to look at. With almost 20 cars to drive, and over 40 real world tracks to choose from, Rally

Guide to ratings

★	Ashes to ashes
★★	Barely smoldering
★★★	Well alight
★★★★	Glowing embers
★★★★★	Red hot

Masters has the depth to keep gamers interested for quite some time. This is a must-have for PC driving fans, and is well worth a look for other gamers.

Alan Crawford

Contact OziSoft
Phone (02) 9666 0100
Online http://www.us.infogrames.com/games/rallymasters_pc/
Price TBA
Requires Pentium 233, Windows 95, 32M RAM
Classification G
Rating ★★★★★

Theocracy

Since the release of the superb Age of Empires 2, you might think there's not much room left in the historical real time strategy genre. If Theocracy is any indication of the competition, you're probably right.

The setting is Aztec Mexico and you have 100 years to build your empire, unite the divided provinces and prepare yourself for the onslaught of the Spanish conquistadors. Philos Laboratories has done a good job of recreating the atmosphere of the era, with some nicely detailed architecture and unit animations and soundtrack.

Like all games of this type, you start with a handful of units and expand your empire by gathering resources, harvesting food, constructing buildings and generating units. Slaves are the empire's primary workers, although they can be 'promoted' to other classes (tradespeople, warriors, jaguar handlers). They can even be sacrificed to the gods. This increases your mana reserves and the ability of your priest units to cast spells. The use of magic is one of the more original aspects of Theocracy and certainly differentiates it from its more historically accurate peers.

The military units are much more limited. There are only three: swordsmen,



Supastars

Popstars did well for the Seven Network; low cost, lotsa hype — it was a no-lose situation. And it hasn't taken long for knock-offs such as Supastars to arrive. Brought to you by Intel and Channel V, this game revolves around launching your own Supastar into the music market using some fairly dull and repetitive Flash and Shockwave-based games.

To access the Supastars Web site, you need to sign up with Intel's Web Outfitter service, but it's not clear why. This requires a Pentium III system. You also need plenty of patience, as the program downloads and installs Beatnik, Flash and Shockwave plug-ins. We were very thankful to be on a quick office line, as downloading all this on a 28.8Kbps modem would be very painful.

Supastars is a turn-based role-playing game based on some of the worst and most repetitive games we've ever played. Our turn ran something like this: click 'write lyrics'; play music trivia game as a result. Click 'perform gig'; play fight game as a result. Click 'publicity stunt'; play music trivia game again. Click 'perform gig'; play fight



game again, and fight the same combatant. Eventually, we worked out that we could win the fight simply by putting up our hands and waiting for the computer to wear itself out. Ponder how much better the free games are on Shockwave.com.

Supastars is bad. It quickly degenerates into 'I could have more fun with a handful of broken glass'. If you're addicted to online games, try Shockwave.com, and if you're addicted to Popstars, the Seven Network will probably roll out another series all too soon.

Alex Kidman

Online <http://www.intel.com.au/>
Requires Pentium III
Classification N/A
Rating ★★★

spearmen and archers. Jaguars can also be used in combat, but as soon as the handler is killed they turn on whoever is closest, usually your own troops. Despite being able to arrange your troops in custom-designed formations, battles usually degenerate into a formless brawl. There is no adjustable game speed setting, so battles are often over before you've had a chance to marshal your troops properly or set up your spell-wielding priests.

Despite a few original touches and an intriguing setting, Theocracy lacks sufficient depth or polish to compete with the frontrunners in the genre.

Jon Gill

Contact Jack of All Games
Phone (02) 9482 3455
Online <http://www.theocracy.com/>
Price \$75.95
Requires Pentium II 233, Windows 95, 32M RAM
Classification G(8+)
Rating ★★★

Thief II: The Metal Age

The first of Thief's two releases, The Dark Project, started something of a revolution in first person gaming. Until then, gaming culture had produced players with two primary strategic concerns: health and firepower. For Looking Glass Studios, releasing Thief into this environment was risky because the game's strategy is almost exclusively premised on stealth. Rather than mindlessly blasting your foes to dust, your goal is to rob the enemy and avoid confronting them as much as possible.

The risk paid off, and earned the developers widespread acclaim. Gamers discovered the exhilaration of entering a heavily guarded fortress, armed only with a cat-like predatory wit and primitive weapons, of boldly stealing a prized item from under the enemy's nose, and escaping without being noticed.

Thief II is essentially a continuation of the original game in that players resume the persona of master thief, Garrett. Garrett lives in a surreal, Gothic-inspired



medieval metropolis, but while *The Dark Project* seems to be set in the dawn of an industrial era, *Thief II* moves the action to a later, slightly more technically advanced time. Metal and machines play a dual role in *Thief II*; they enhance the gameplay, but they are also a sinister element of the new story-line. For Garrett this means new challenges in the form of intelligent clockwork androids and surveillance cameras; for *Thief*'s tyrannised under-class, it means an end to its fundamental freedoms.

Superficially, *Thief II*'s gameplay is almost identical to the original. Aside from the fact that Garrett must deal with new mechanical surveillance devices, the most obvious additions to the game strategy appear in his equipment arsenal. He now has a few extra tools to choose from. These include the Scouting orb, which allows him to observe an area he is trying to penetrate from a safe distance, and two new potions: slow fall and invisibility.

The makers have been criticised for the game's lack of innovation, but some significant enhancements have been made that aren't immediately visible. The game's AI has been overhauled, and allows Garrett's opponents to behave in more sophisticated ways. For instance, they now navigate around or climb over objects to reach him rather than bounce around in frustration.

The original game was great, so we've got to give *Thief II* the thumbs up.

Andrew Colley

Contact OziSoft
Phone (02) 9666 0100
Online <http://www.lglass.com/thief2/>
Price \$87 (est)
Requires Pentium 233, Windows 95, 48M RAM
Classification M(15+)
Rating ★★★★★

Wall Street Tycoon

To be successful, a computer game needs to bring together a number of elements. It

Games News

● A startling announcement has come from perhaps the world's best (or at least best known) development team. id Software, creator of games such as *Wolfenstein 3D*, *Doom*, *Doom 2*, *Quake*, *Quake II* and *Quake III Arena*, has confirmed its next project will be *Doom 3*. John Carmack, who has been at id since the beginning, made the announcement through his .plan file (an online work diary of sorts). Carmack also made public what industry pundits have long suspected — something is rotten at id. Two of the owners, Adrian Carmack (no relation) and Kevin Cloud together own more than 50% of the company, and as such their words carry plenty of weight. The two didn't want to pursue *Doom 3* — they were interested in a different genre. After talking it over with his staff, John Carmack presented an ultimatum to Adrian Carmack and Cloud — either *Doom 3* is next, or the entire team would quit. Cloud and Carmack acquiesced — *Doom 3* will be the next project — but (extremely) outspoken id artist and modeler Paul Steed was fired for participating in the ultimatum, according to John Carmack. Steed will bounce back. There are plenty

of other opportunities for someone with his experience.

The way events have unfolded is surprising: the usually circumspect leader John Carmack has involved the public, and the tales of management bickering and backstabbing are more like something you would expect from *Ion Storm*!

● Which game has generated more column inches than any other in the mainstream press over the past two years? Probably *Quake III Arena*, but *Daikatana* has to be a close second. John Romero has certainly proved that he's more than able to generate publicity for his projects. But now that the game is out, has the wait been worth it? Not surprisingly, no. The reviews are unimpressive. The game is OK, but it's nothing groundbreaking, there's nothing new and it's no different to many others. When announced, the feature set for the game was at the top of its field, but that was almost three years ago. Due to an insanely long production time, *Daikatana* has since been left behind. Optimistic to the last, Romero is still predicting that *Daikatana* will be the highest selling game of all time.

Gamespy

needs to be fun to play and it needs to harness the latest graphics and sound technology. Management simulations do not need bleeding-edge visuals or great sound, but they still need to be enjoyable, otherwise they run the risk of becoming incredibly boring. Unfortunately, *Wall Street Tycoon* fits into the latter category.

As a simulation of the stock market, it's not what most gamers would consider exciting. Not only have Ubi Soft chosen a poor concept for the game, they have executed it in an incredibly cumbersome fashion.

Wall Street Tycoon offers a number of scenarios, ranging from historical periods such as the Roaring '20s and The Great Depression, to the present day. An option to download recent share prices from the Internet is included, but in keeping with the game's overall quality, it failed to connect to the server.

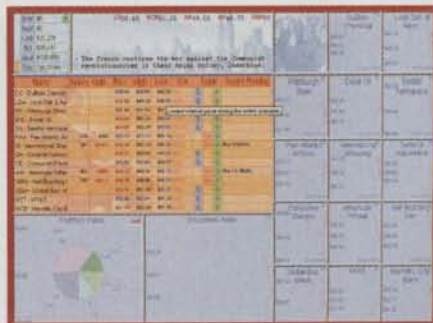
Each scenario gives you a list of companies to trade shares from, and a radio announcer reading the latest news items in the background. The overly simple interface shows current share prices and graphs indicating trends in the market. The way to win the game is to trade shares

until you've earned a certain amount of money. The lack of fulfillment one gets from playing this game is unparalleled.

Wall Street Tycoon is a genuine contender for worst game of the year.

Alan Crawford

Contact Ubi Soft
Phone (02) 9362 1414
Online <http://www.ubisoft.co.uk/>
Price \$75.95
Requires Pentium, Windows 95, 16M RAM
Classification G
Rating ☆



Travel through place, space and time.

Journeys far and wide

Astronomy: An Immersive Journey Through the Universe

If you think the night sky is big, this double CD program is bigger. Admittedly it's not as easy to use as some, but the menu complexity is necessary to cope with the sheer scope of the thing.

The opening menu allows you to select from a dossier of information, stories, astronomy tours and breaking news — the latter through a Web site link.

You can opt for simple viewing or for hands-on viewing by setting up a virtual observatory, which can be situated on earth, in space or wherever you like. The night and day skies rotate at your command, and you can step backwards and forwards in time at the click of a mouse.

Although the mechanics behind this program must be immense, it didn't crash or show the moon upside down once, which is very impressive. The history section and video tours are equally well presented, with good narration and excellent graphics of starbursts, solar systems and black holes. You can even cross-reference your telescope findings with the interactive screen chart to see if you have discovered a new comet.

Sadly, the program says UFOs are probably only shooting stars or aircraft — surely it could have left us wondering. Apart from this, Astronomy is fascinating for anyone who has ever looked up at the night sky and wondered what that bright star is called, and how it got there.

Jeremy Torr

Contact Roadshow Interactive
Phone (02) 9552 8772
Online <http://mattelerinteractive.com/>



Price \$76
Requires Pentium 100, Windows 95, 16M RAM
Rating ★★★★★

A Distant Home: A History of Jews in Australia

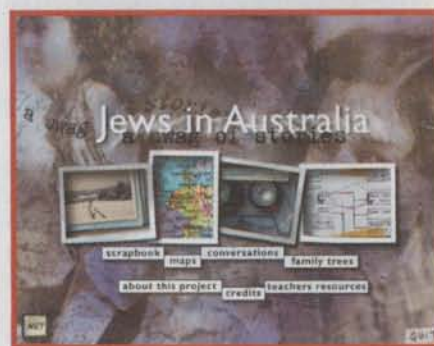
Jews of Australia: A Swag of Stories

These two titles were published by the Jewish Museum of Australia. A Distant Home traces the history of Jewish life in Australia from the arrival of the First Fleet to the present.

It is divided into four sections, but the distinction between them is occasionally blurred and some areas overlap. 'Journey' details the different waves of Jewish immigration from various parts of the world. 'Being Australian' lists the many contributions of Jews to Australian society, including politics, social justice and sports. 'Arts and Culture' discusses the achievements of Jews in arts and culture, and has the all-important recipe for bagels. 'Community' describes the structure and organisation of the Jewish community, and provides some demographic information.

All sections have photo, text, audio and video annotations. The choice of subjects covered and people profiled is perhaps a little stodgy. Very few people profiled are under 40, and many who have recently achieved prominence are left out, such as mining entrepreneur and Melbourne Football Club owner Joseph Gutnick or DJ/producer Josh Abrahams.

A Swag of Stories (for PC only) is the story of four Jewish families as told by three successive generations. It includes photos, maps, family trees and recorded interviews. These are searchable by date and topic, and most visuals are annotated with captions and segments of the recorded interviews. There is an unfortunate lack of attention to spelling and grammar, and errors such as "1980's" and "Pope Jean Paul II" crop up. The installation procedure is more complicated than you would expect from a multimedia title, so read the instructions carefully.



Both CD-ROMs are visually very nicely put together and easy to navigate around, with subtle and clever use of sounds and animation, and their historical credentials are impeccable. However, their usefulness as an educational resource is limited by the fact that none of the text can be printed or copied and pasted into another document.

Josh Mehlman

Contact Dataworks
Phone (03) 9764 8344
Online <http://www.dataworks.com.au/>
Price \$49.95 each
Requires Pentium 90, 16M RAM, 100M hard disk space
Rating ★★★

Maps: The War Series

This National Geographic CD-ROM contains digitised versions of all its fold-out maps of 20th century conflicts, and the American Civil War.

The maps are exact reproductions of those found in the magazine. They can be expanded to fill the screen, and you can scroll around in the usual way or use the Pan button to centre the map on a point of interest. You can also zoom in and out manually or by using preset buttons, but by the time details such as place names are legible, you are looking at a very small part of the map and tend to lose orientation.

The maps can be copied or printed for projects, but be prepared to look closely for the print button and other controls, which are hidden in the Show Tools pop-up menu.

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The CD-ROM does not only contain maps; there are also introductory videos on the use of maps in wartime and an audiovisual timeline of the history of maps. Also of interest are stories and anecdotes from *National Geographic* itself about the importance of its maps, methods of map production and the difficulties of making them. There is also a link to the National Geographic Web site, which is basically a marketing tool.

The main problem from an Australian point of view is the strong US bias. Apparently the US won both world wars on its own! The search function is rather unreliable, so that searching for Gallipoli and Kokoda returns no result. Mind you, neither does London or Tobruk. The search function will take you to the appropriate map for Ypres but then you have to perform a second find operation to locate the actual town. Both searches have extremely limited indexes.

The other major disappointment is the lack of animation to show the course of battles or changing boundaries.

Unfortunately, this comprehensive collection of detailed maps is of limited use.
Catherine Howard

Contact	Dataflow
Phone	(02) 9420 6710
Online	http://www.nationalgeographic.com/
Price	\$29.95
Requires	486/66, Windows 95, 16M RAM
Rating	★★★

David Hart: The Interactive CD-ROM

For shameless self-promotion thinly veiled as information, CD-ROM would have to be the ideal medium. It's cheap, highly accessible and seemingly more authoritative than a mere pamphlet.

David Hart: The Interactive CD-ROM is this kind of product, and it's certainly a shocker. David takes us through his

Interactive News

- Hewlett-Packard has been forced to admit that (at best) it made a blunder, and (at worst) misled the buying public. Their handheld Jornada 545 unit, running Microsoft's much vaunted Pocket PC OS, doesn't display nearly as many colours as Hewlett-Packard claims. Hewlett-Packard's Jornada was launched earlier this year with great fanfare, and much was made of what the Jornada can do that a Palm unit can't, including the amount of colours it can display. The Jornada, Hewlett-Packard officials said, can display an amazing 65,000 colours onscreen, compared to Palm's colour unit, the Palm VII, which can only manage a paltry 256 colours. As it turns out, the Jornada series can only display 4,000 colours due, Hewlett-Packard representatives said, to "a mistake in the development process". The "mistake" also applies to earlier incarnations of the Jornada, the 420 and 430. Hewlett-Packard is offering a full refund to disgruntled buyers worldwide.
- Convergence is still a big topic in the world of Internet appliances, and manufacturers are scrambling to get as many functions as they can into devices as tiny as possible. Some ideas seem to

stretch plausibility a little too far (multiplayer WAP games? yeah, right), but others are quite exciting. Mobile phones are the major target for added functions, and even though the furore over MP3 music files continues, by this time next year all the major phone manufacturers will have MP3 players included with them, or available as an add-on unit. To begin with, the phones will come with about an hour of MP3 storage, but the goal is for people to purchase tracks by downloading them wirelessly. Of course, this isn't going to become viable until wireless data access speeds are greatly increased. In Europe this is expected to begin happening next year, and Australia shouldn't be too far behind.

- If you're becoming a bit of a WAP-head, here's some good news: Belgian company EZOS has released the first platform-independent WAP browser. Compatible with desktops and PDAs, the browser is fully compliant with WSP/WTP through a WAP gateway, and even features customisable skins. Sure, WAP may just be a passing (read marketing) fad, but you may as well enjoy it while it lasts.

Gareth Jones

admittedly painful adolescent journey through drugs, motorbikes and lawn mowing to his success as a Brisbane-based professional painter and minister of God. We end up in his virtual gallery where, highly interactively of course, he shows us his favourite paintings. All of them come with a ticket, advice as to their collectability and a message from his sponsors, the local accounting business.

Tacky hardly starts to describe his approach when a list of prices pops up over his collection of hangings and he says that his prime objective is painting what sells.

Of course, there is more to the CD than hard sell. Lots of dodgy grammar, gooey pictures of his family and advice on how to achieve success in business (do we hear a motivational CD in the making?) are also included. This is all a bit of a shame, as technically this is excellent work; good sound, nice video and some very clever menuing.

David (or his accountant) has the last word, as the program doesn't run from the hard disk — presumably so you can't steal those valuable images. As a result, the CD

takes ages to load each time you want to view it, and it crashed or froze frequently on our review machine.

Paying for this disc should be against the law.

Jeremy Torr

Contact	Dataworks
Phone	(03) 9764 8344
Online	http://www.davidhart.com.au/
Price	\$39.95
Requires	Pentium, Windows 95, 8M RAM
Rating	★



Drinkin' and gamin'

APC staffers set out to test the effects of alcohol on our ability to play games. It was supposed to be a controlled experiment, but things deteriorated rapidly.

In the past few years, especially since the advent of the Internet, there has been a major shift in people's thinking. An enthusiasm for IT is no longer the preserve of nerds or something to feel ashamed about. For a decade or so, computer gaming was something that had to be done in the rumpus room, study or shed — rarely in the lounge room.

In recent years, the Nintendo and PlayStation gaming systems have taken us back to the early 1980s when family and friends would crowd around the television set playing Pong on



paddles. Gaming has become a social occasion again, and what's more social than getting a group of friends together with a bottle of wine, some beer and a few games?

Over the years, APC staffers have done just that, and a debate arose recently over whether or not we get better at playing games when we've been drinking. The prevailing view was that we all get better and deadlier playing first person shooters, but we weren't so sure about driving games. In homage to the classic *PlayStation Magazine* feature, APC put the theories to the test.



Ryan Shaw, APC's technical assistant, is a VW bug fanatic. He aspires to buying a Kombi and currently owns a green VW called the 'HellBug', which says more about Ryan than we care to know. We were particularly interested in seeing how he'd handle *Need for Speed: High Stakes*, which has cars that travel at over 80 kilometres an hour.



When not reviewing hardware and software for APC, senior reviewer Darren Ellis indulges in his favourite hobbies — beer and gaming. In a flash of cosmic synergy, these two interests fused together in this feature to present Darren with an opportunity far too strong resist. "All we need now is to make drinking and gaming an Olympic event and I'm set," he said between stubbies.



As a lover of anything vibrant, colourful, musical and fun, Web assistant Laura Kane may not have been the best possible choice for our control (see 'How We

Teshtud', page 185). She was also the token woman in the group, so all references to 'women drivers' and such have been deleted from the text. Not that we made any, mind you.



Having held down more jobs than was once thought humanly possible, features writer Josh Mehlman manfully took a no-alcohol stand in this feature. This gave him two prime opportunities: to gauge how we performed under the effects of alcohol, and to laugh at our drunken antics.



A former surfer turned IT guru, APC's Workshop editor Andrew Colley was a little hesitant to get involved in the harder beer-related aspects of this feature, but he was exceptionally keen to get stuck into the

racing. It became apparent early on that he was not to be trifled with once he got behind the wheel, and his intense approach to carving up the bitumen didn't slacken with the onset of drunkenness as we'd hoped.

The Need for Speed

After a quick photo shoot, we started off with *Need for Speed: Hot Pursuit*. Our mission was to record lap times as a control for future comparison. No one had driven this track before, so we all practised driving other courses to become accustomed to the feel of the wheel and the pedals. At this stage we were beer, V and water free.



Performance was fairly standard to begin with, but there were more crashes and bad driving than we care to admit.

A few beers in, and the driving started to change. Players began to wrestle the wheel more forcefully and drive more intensely. They also progressed from talking to the computer-controlled cars to shouting abuse at them.



More daring driving, more heroics, and far more traffic infringements



Here we see a Hollywood approved side swipe of a Police car...



... and the consequences.

After upping the beer/V quota, racing began to get personal. It was no longer enough to beat the computer-controlled racers; at an unspecified point in the proceedings another goal emerged — annihilating them.

One strategy involved whipping the car sideways when a police car or other racer was approaching, in an attempt to run them off the road. More often than not, this incapacitated both vehicles; running off the road or into trees were common results. "Next race" was an oft-heard threat.



When it's winning that matters, speed limits are merely an option.



Those empties start to clog up the dashboard



Any resemblance between Darren after a few beers and Billy Bob Thornton's character in *Sling Blade* is purely coincidental.



And, of course, things went a little too far (but it didn't seem to affect her driving).

Note: Playing driving games is completely different to driving a real car. Never, ever, drink and drive.

Soldier of Fortune

Need for Speed: High Stakes did not come close to quenching the thirst for blood that had begun to permeate APC, so it was time to take it up a notch and start shooting each other. The two machines were only networked for Soldier of Fortune deathmatch, which produced more of a hunt-and-kill game than the usual bloodbath free-for-all.

Periods of stealthy searching were broken by astoundingly intense fire fights and blood-letting. This is what the crowd had come to see: two beverage-crazed staffers fighting it out, no holds barred.



If you think the game is violent, just be thankful you can't see Josh and Darren's grins.



Things can get intense in Soldier of Fortune. Two down, three to go.

Conclusion: Impossible

Times recorded for the racing game were inconclusive. Some drivers got faster, some got slower, but overall the times remained about the same. The contention that we got faster in first person shooters when drunk was unproven, as we were well sloshed by the time we got around to duking it out and had no results to compare against. But as any pool-playing pubgoer can tell you, there's a window of brilliance hidden somewhere between the *n*th and *x*th drinks. Anyway, it certainly *felt* like that.

The only solution is for APC to allow us to do it again sometime, you know, in the name of science.

How we teshtud

We tested ourselves on two games: Need for Speed: High Stakes and Soldier of Fortune. The tests were simple: playing the games while drinking more and more beer, and keeping track of our progress. Of course no experiment is possible without a control subject. Josh Mehlman became our control subject after bravely volunteering to drink no beer whatsoever, only bottled water.

If Josh was our control subject, Laura was our anti-control for this experiment. Instead of drinking no alcohol, she indulged her one addiction — the high-caffeine energy drink called V (<http://www.vitalise.com/>). It's a guarana and vitamin B drink that gives you a good energy boost. On any given day at work you will see two Lauras — pre-V Laura and post-V Laura. The difference can be measured not only in energy and activity levels, but most noticeably, in volume. Usually one V does the trick, but on this occasion we supplied her with five. V drinkers should note that three bottles is the recommended daily limit.

We used the following test equipment.

- Two 800MHz systems (one Pentium III, one Athlon) networked for Soldier of Fortune. The 800MHz Athlon was used for Need For Speed: High Stakes.
- Logitech Wingman Formula Force steering wheel
- Need for Speed: High Stakes
- Soldier of Fortune
- A slab of Victoria Bitter
- One bottle of water
- Five bottles of V
- Assorted chips and snacks



An in-depth look at personal and corporate IT success stories.

Corporate reflections

Success in IT

Success in IT is based on interviews with 30 of Australia's leaders in the information technology industry. It claims it will leave readers "surprised, humbled, entertained, driven to action and inspired". Unfortunately, it falls short of its promise and its potential.

Author Robert Williams interviews some of the best thinkers in the field, including Roger Allen (Allen & Buckeridge), Valda Berzins (Australia Post), Gail Burke (Macquarie Bank), David Merson (Mincom) and Neville Roach (Fujitsu). Disappointingly, the book does not detail any mistakes these leaders have made during their careers, and more importantly, fails to tease out the valuable lessons they have learnt, leaving readers with little practical advice and inspiration to take away.

The interviewees share their personal beliefs on what they see as important character traits, habits and abilities for leadership. Williams' questions should have gone one step further, by exploring how each of the individuals got where they are, eliciting war stories about the challenges they faced along the way, and by explaining how they overcame those obstacles.

Many of the leaders share similar philosophies and management styles, which means the content is sometimes repetitive. There are only so many times you can read about the need to reduce stress or the importance of persistence and focus in achieving success before it becomes monotonous.

The most interesting material in the book is the anonymous questionnaire completed by each of the people profiled. It is here you find out that over 60% of the industry's leaders drink between six and 15 alcoholic drinks per week, that 40% have been married two (or more) times, and that 80% have

a fear of rejection.

Success in IT is a disappointing read. It had the potential to provide a unique insight into experiences of the industry's

leading figures, but instead it skirts around the hard issues. Had more thought and planning gone into the interviews and into the execution, Williams could have produced an absolute winner.

Cathie Kennedy

Author	Robert Williams
Publisher	The Foundry Works
Contact	Tower Books
Phone	(02) 9975 5566
Price	\$19.95
ISBN	0-646-38839-8
Rating	★★☆

Making the Cisco Connection

Making the Cisco Connection: The Story Behind the Real Internet Superpower is an account of the history of Cisco, one of the IT industry's most profitable companies.

The story focuses on the four people who have been at the helm of the company since its formation, and examines their influence on the company. The early chapters tell the story of the company's founders, Sandra Lerner and Leonard Bosack, along with the enormous contribution of the first president and CEO, John Morgridge. The bulk of the book looks at the impact of current CEO John Chambers, who first arrived at Cisco in 1991 as senior vice-president of worldwide operations and was groomed for four years as Morgridge's successor.

It is interesting to learn of Chambers' mild dyslexia, which perhaps explains his drive for Cisco to develop the Internet from a text-dominated medium to a voice-integrated one.

It was disappointing to find only scant mention of Cisco's competitors. Author David Bunnell includes a few pages about "battling other number-ones" such as Lucent, Nortel, Alcatel, Siemens and Ericsson. However, this is more a brief overview of the companies' products and position than an analysis of their impact on Cisco.

When reading, you frequently get a sense of déjà vu; many points and anecdotes are repeated, often in the same context in different chapters. For example, the fact that the corporate culture is one of "tight-fistedness, customer focus, risk taking and open doors" is mentioned at least

five times. It seems the book could have benefited from one last edit.

Anyone responsible for developing an ecommerce strategy for their business will find the discussion on Cisco's online customer service, sales and ebusiness strategy an inspiration — there are lessons to be learnt from one of the top revenue-producing Web sites in the world (it grossed \$75 million in sales in the first five months it was online).

The book also tells the story of an innovative HR approach. Cisco employees, for example, are given bonuses for recommending new recruits through the 'Amazing People' scheme. A 12-month lease on a Porsche is the reward for the person who provides the most successful referrals in a year. Other benefits include access to the company gymnasium and sports courts, free non-alcoholic beverages, medical check-ups, onsite car maintenance and even dry cleaning services. However, not all the benefits discussed in the book are available to Cisco employees in Australia.

The book also provides an insight into how Cisco has managed company acquisitions, successfully integrating people, systems and cultures.

Making the Cisco Connection will appeal to those who keenly follow the strategies behind successful companies, and to those who work in the IT industry.

Cathie Kennedy

Author	David Bunnell (with Adam Brate)
Publisher	Upside Media
Contact	John Wiley & Sons
Phone	(02) 9805 1100
Price	\$39.95
ISBN	0-471-35711-1
Rating	★★★



Making the Cisco Connection was supplied by McGills Bookstores. Contact McGills online at <http://www.mcgills.com.au/>, or by phone in Melbourne (03) 9602 5566 or Brisbane (07) 3221 9939.

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Off the rack

Adbusters

If you've heard of 'culture jamming' or Buy Nothing Day, then you probably know the work of Adbusters, a Canadian group that opposes pollution of the "mental commons".

The "journal of the mental environment", Adbusters magazine is only available in a few 'alternative' bookshops in Australia. However, much of the magazine's content is now republished on the Adbusters Web site. The current issue features an interview with Theodore Roszak, the man who coined the term 'counterculture'. He talks about his latest linguistic invention, ecopsychology. As well as the magazine, check out Adbusters' uncommercials, or follow the link to cokespotlight.org, a site developed by



Adbusters and Greenpeace Australia which criticises Coke's approach to Sydney's 'Green Games'.

Glenn Phillips

Online <http://www.adbusters.org/>
Rating ★★☆☆

BRW

BRW is Australia's leading weekly business magazine, and it's easy to see why. It gets right down to business.

Quality journalism and informed commentary fill the pages of this site, which covers news and analysis of the business and financial world. BRW online also features useful information, tools and resources for readers, be they consumers, business people, investors or entrepreneurs. For example, the site contains links to PriceWaterhouseCoopers' electronic tax bulletin.



What makes this value-added magazine site different to many others on the Web is that most of its online content appears in its entirety, closely mirroring the print edition. There is also full access to back issues.

Vanessa Fazzino

Online <http://www.brw.com.au/>
Rating ★★☆☆

juice.net

juice.net is another attempt at a portal for the young people of Australia. It's produced by Terraplane (now known as terraplanet.com), the publishing company set up by Toby Creswell when he resigned as the editor of *Rolling Stone Australia* and established its main competitor, *Juice*.

As well as news and reviews of music, juice.net covers movies and games. There are also a number of online radio stations, and you can register for a juice freemail address. As a registered user, you can visit juice.net's shops and order food from Cuisine Courier or CDs from ChaosMusic, or look for a job with Seek. The most original thing about juice.net is its selection of online comics, includ-



ing one where you can defend a world called, err, Terra Planet from an invasion of pokies.

Glenn Phillips

Online <http://www.juice.net/>
Rating ★★★

New Scientist

The favourite weekly for science students and enthusiasts everywhere, *New Scientist* is one of the best examples of science journalism in print. Its stories are well written, relevant and accessible, and it doesn't stray too far into 'science is the only answer' territory.

Much of the magazine's content is now reprinted online, and you can subscribe to an email bulletin to get a run-down of the



week's top science stories. The archive of stories would be a useful tool for high school and university students, and if you're about to graduate it may be worth checking newscientistjobs.com, the site's careers guide.

Glenn Phillips

Online <http://www.newscientist.com/>
Rating ★★★★★

Ralph

Ralph unashamedly turns it on for the archetypal (read stereotypical) Aussie bloke.

The naked truth is that *Ralph* markets and sells itself on a platform of sex — propped up by women, sport, booze, ego (and lots of it) — and all kinds of 'men's stuff'.

Online readers are tantalised with bite-sized chunks of the print magazine:



"When you're talking about what's between your legs, size counts for plenty". For the full-frontal, you need to pick up a hard copy of the mag. (Incidentally, the article's about a Kawasaki motorbike.)

And if wheels don't do it for you, there are close-ups of some of the "sexiest women in the world", which you can vote for in Ralph's online 'Babespoll'.

Either way, there's enough to keep you entertained here for a whole ... err, 10 minutes.

Vanessa Fazzino

Online <http://lifestyle.ninemsn.com.au/ralph/>

Rating ★★

Wallpaper*

*Wallpaper** describes itself as the "world's first global style magazine". Think of it as a cross between the aesthetics of *The Face* magazine and the subject matter of *Better Homes and Gardens*. The magazine for "urban modernists" claims to have broken all the rules of publishing and to have done the same with its Web site.

Like the magazine, the site is all glossy. It is constructed almost entirely in Macromedia Flash, and the content appears as a ribbon in the middle of the screen. A Rubik's Cube-like panel allows you to navigate through its various sections. Travellers can download the magazine's 'Navigator' city guide, and foodies can get feedback on the seating arrangements at their next dinner party.

Glenn Phillips



Surfbaud: Magazine mayhem online

It's well known that it is very difficult for new magazines and newspapers to enter the Australian market, particularly when they emerge from outside the Fairfax, Pacific Publishing, News Ltd or ACP publishing houses. It's even more difficult for magazines to succeed online, as no-one has yet worked out how to make money publishing on the Net. So far this year, two high-profile news magazines (one in print and one online) have folded not long after they were launched.

Text Media's *The Eye* was a fortnightly print magazine, a bit like a 'hip' version of the *Bulletin*. The magazine's Web site was launched simultaneously with the print version, and the publisher registered the arcade.com.au domain name, presumably for a shopping site based on the Arcade advertorial section in the magazine. However, the site was never built. The magazine did not sell enough copies to attract advertising dollars, and it closed in April.

The Zeitgeist Gazette was a satirical news review published at 3pm each weekday on the Net only. The site carried no advertising, but charged an annual subscription fee of \$365. Zeitgeist folded when it failed to attract enough subscribers to remain viable. Apparently, Net users want information to be free.

Will Internet users pay to access content if it's experimental and controversial? Former gossip columnist with *The Eye*, Stephen Mayne, is testing the waters with his new online news magazine, Crikey. Mayne gained some notoriety last year when he ran against Jeff Kennett in the Victorian state elections and published an 'insider' site called Jeffed.com, based on his experience working for Kennett. Crikey now promotes itself as "Bringing down governments since Sept '99". Mayne also won a Walkley Award in 1999 for his 'AGM Season 1998' series for the *Daily Telegraph*, where he broke the rules of business journalism by buying shares in companies to attend their AGMs and write first-hand reports of the events.

Instead of carrying banner ads, Crikey hopes to generate revenue through its subscription-only sister site, Shareowner. Subscriptions to Shareowner will be \$50 a year, and the site will cover business news by attending AGMs, raising shareholder issues at the meetings, and standing for the boards of companies. Mayne believes his site will attract paying subscribers because it is a specialised news service, not a general news and reviews magazine.

Glenn Phillips

Online <http://www.wallpaper.com/>

Rating ★★★

Wired Magazine

Boasting a monthly circulation of 475,000 and an editorial staff list even longer than APC's, *Wired Magazine* is an award-winning US publication which is unlike most technology titles. But who would expect a magazine that claims to be "on the front lines of the 21st century" to be anything but extraordinary?

In its own words, "*Wired Magazine* is the journal of record for the future. It's daring. Compelling. Innovative. Courageous. Insightful. It speaks not just to high-tech professionals and the business savvy, but also to the forward-looking, the culturally astute, and the simply curious."

"Each month, *Wired* covers the people, companies, and ideas that are transform-

ing the way we live. It delivers incisive analysis and resonant storytelling from some of the world's most provocative writers."

Don't just believe the hype, though. Check this one out for yourself.

Vanessa Fazzino

Online <http://www.wired.com/wired/current.html>

Rating ★★★★★



Bloody Fist's Mark N spoke to *APC* about Newcastle, Amigas and the meaning of hardcore. By Vanessa Richardson

Fist of fury

Newcastle's Bloody Fist Records started in 1994 when Mark Newlands and Aaron Lubinski pooled their dole payments to fund the pressing of 100 copies of a 12" record. Its catalogue is still dominated by 12" vinyl releases of tracks created on first-generation Amigas. Largely ignored by the Australian music industry and the media, Bloody Fist's artists sometimes push their music in completely inaccessible directions. Yet the label has achieved international prominence with a style of music it describes as 'industrial hardcore'. This music is recognised as among the best of the genre, and is distributed internationally. Several Bloody Fist artists have toured Europe, and are famous in Germany despite being obscure in Australia.

Bloody Fist releases a broad range of industrial hardcore tracks, a selection of which are included on this month's cover CD. In the UK, the kind of music Bloody Fist releases is generally classified as 'gabba'. UK music writer Simon Reynolds (see <http://members.aol.com/blissout/>) sees this style of music as fired by the energy of working-class youth.

"Gabba and thrash metal share a similar audience: white working-class males, kids whose hopes have been crushed by the decline of heavy industry and who face unemployment or ignominious, no-security/no-future jobs in the service sector. From Brooklyn to Rotterdam, from Glasgow to Australia's Newcastle, gabba expresses the rage and frustration of White Niggaz With Attitude and Without Prospects. Like metal, gabba is disdained by discriminating hipsters, who — coming from middle class backgrounds — don't understand the mentality of those who need music to go mental to."

Bloody Fist's Mark Newlands (known as Mark N) says this description fits the label's music well. "Newcastle is a great



place if you know how to turn it to your advantage. A lot of kids grow up here with the idea of leaving Newcastle for a bigger and better place due to the fact that well-

paying jobs are scarce here, and there really isn't a lot that can be done about it in the short term. The city looks quite derelict in some parts — leftover remnants of economic good times now passed. The steelworks has closed after 86-odd years. A lot of people in the community feel cheated and pissed off. This sort of bleak outlook tends to result in a lot of unemployed young people with quite large chips on their shoulders. For that very reason, Newcastle tends to be a hot spot for a lot of aggres-

sive music and music with dour feeling (the hardcore punk scene in Newcastle is also strong).

"I suppose the output on our label represents a lot of the frustration felt by people both our age and younger. Older

people in Newcastle are either scared shitless of us, or don't like our attitude. Rightly so. They are the ones who want to sweep Newcastle's problems under a nice little rug, from the comfort of their new luxury units. We are expressing what we truly feel in the only way we can be heard properly — through our music and our label."

Bloody Fist's artists are renowned for pushing old technology to its limits. A lot of the Bloody Fist back catalogue was created on Amiga 500s and 600s running ProTracker. "The biggest selling 12" on our label was produced entirely on an Amiga 600 running ProTracker 1.3," Mark said.

Amigas continue to be popular in the industrial hardcore scene, and there is still a dedicated Amiga shop in the main street of Newcastle. "Amigas have an awesome lo-fi sound, with a bottom end that is quite incredible when heard on a massive system. You can buy an Amiga 500 in almost any junk shop in Newcastle for about \$10 or \$15. They are a cheap and accessible way of making noise for anyone who is that way inclined — and if they bugger up, you throw them away and get another one."

The technology used by its artists helps define the sounds of Bloody Fist. "Some guys upgrade to PCs with their royalty money, thus cleaning up their sound a little, but they still maintain an element of raw aggression. Other guys stick by their



Amiga 600s. Several Bloody Fist acts (Nasenbluten, Xylocaine, Embolism and Syndicate) even toured Europe lugging their 600s around in picnic baskets.

"The more money a producer spends on equipment, the more time it takes to get a raw lo-fi sound. Considering that lo-fi rawness is a part of what we're known for, I don't see the point. You'll never hear a 'nice' record produced on an Amiga. However, there are some tracks that we release which are definitely *not* lo-fi or even that raw. These tracks are usually of quite a dark or sinister nature, something which lo-fidelity equipment rarely lends itself to effectively."

Bloody Fist has developed a strong following, locally and overseas, but neither the Australian music industry nor the media have provided any real assistance. "Australia has a long and boring history of not supporting anything even slightly left of centre, so artists, producers, programmers and even some musicians are forced to look offshore for support. People are generally a lot more open-minded in Europe than at home. Having said that, I'm quite happy to remain in Newcastle, where our subversive behaviour towards certain sections of the community goes largely unnoticed. I like the challenge of a hostile environment."

When Bloody Fist started out, no local distributors were interested in its material, but a few years later, when a lot of Bloody Fist tracks started to be imported back to Australia on compilation CDs, these distributors changed their tune. By this time, Bloody Fist was well respected overseas, and could afford to stand alone.

"We're part of our own industry — an industry where musicians, egos and self-appointed elders and betters are not welcome, and dealt with swiftly and severely when encountered."



We are self-made and completely, utterly and violently separatist."

Whereas the mainstream music industry is still hesitant about using the Internet and MP3s, and fearful that they might already be losing sales because of them, Bloody Fist welcomes new forms of music distribution. "MP3s are good; it's just like modern-day underground tape trading. Even though a lot of our material is floating around on MP3, it doesn't move our focus away from producing 12" vinyl. If people are serious enough about our material, I don't think MP3s will stop them buying our finished product on CD, or vinyl for that matter. What MP3s might do, though, is send a few major labels down the toilet — and that's an awesome thought."

Mark expects MP3s will expose Bloody Fist material to a massive audience, and cut out retailers and distributors. Recently, Bloody Fist's audience has been expanded by its new Web site and by "loads of Napster users downloading Nasenbluten MP3s", but it's a long way from formulating an ecommerce strategy and engineering a reverse takeover of a mining company. "We don't pay that much attention to 'new media', for goodness sake, we still release 12" vinyl! But whenever it comes along, it's probably a good thing to embrace it, or at least give it a chance, and think how it can be turned to our advantage, rather than worrying about losing money or giving away what is ridiculously termed 'intellectual property'."

Bloody Fist is working on putting out a few new 12" releases and one or two CDs before December (but don't hold your breath). One of its artists, Syndicate, will have a new 12" release out shortly after returning from its current UK tour. Bloody Fist also plans to sponsor a car in a demolition derby at Newcastle Speedway, and Mark hopes to upgrade his 1974 Galant station wagon to an '80s model.



Tracks and artists

Bloody Fist supplied the following 10 tracks for this month's cover CD.

- Xylocaine: 'State Facility'
- De-koder: 'Knife'
- Syndicate: 'Mac-11'
- Overcast: 'Loom'
- Subsonic: 'Braized'
- Fraughman: 'Military Mindset'
- Morbus: 'Vanguard of Treachery'
- Aftermath: 'Foetus of Hell'
- Memetic: 'Break-a-rama'
- Nasenbluten: 'Sound of Steel'

These tracks are on disc 2 of this month's cover CD pack, along with more detailed profiles of the artists.

The double CD compilation, NCL Trax V1.0, showcases just about all of Bloody Fist's artists. It includes 30 tracks and is available from the Web site for \$25 plus postage.

For more information about Bloody Fist or to order music, visit the official Web site at <http://www.bloodyfist.com.au/>. Bloody Fist also has a shop in central Newcastle.

Next-generation number plates

Thinking of getting a personalised number plate? Why not be even more pretentious and go for a technology theme? Here are Chip Chat's suggestions, but be warned: some are real.

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WEB-404

APC - THE TECHNOLOGY STATE

DOT-COM

APC - THE TECHNOLOGY STATE

SOL6-00PS

APC - THE TECHNOLOGY STATE

WWW-CAR

APC - THE TECHNOLOGY STATE

COM-CON

APC - THE TECHNOLOGY STATE

MS-V-DOJ

APC - THE TECHNOLOGY STATE

LINUX-4-ME

APC - THE TECHNOLOGY STATE

BIG-MAC

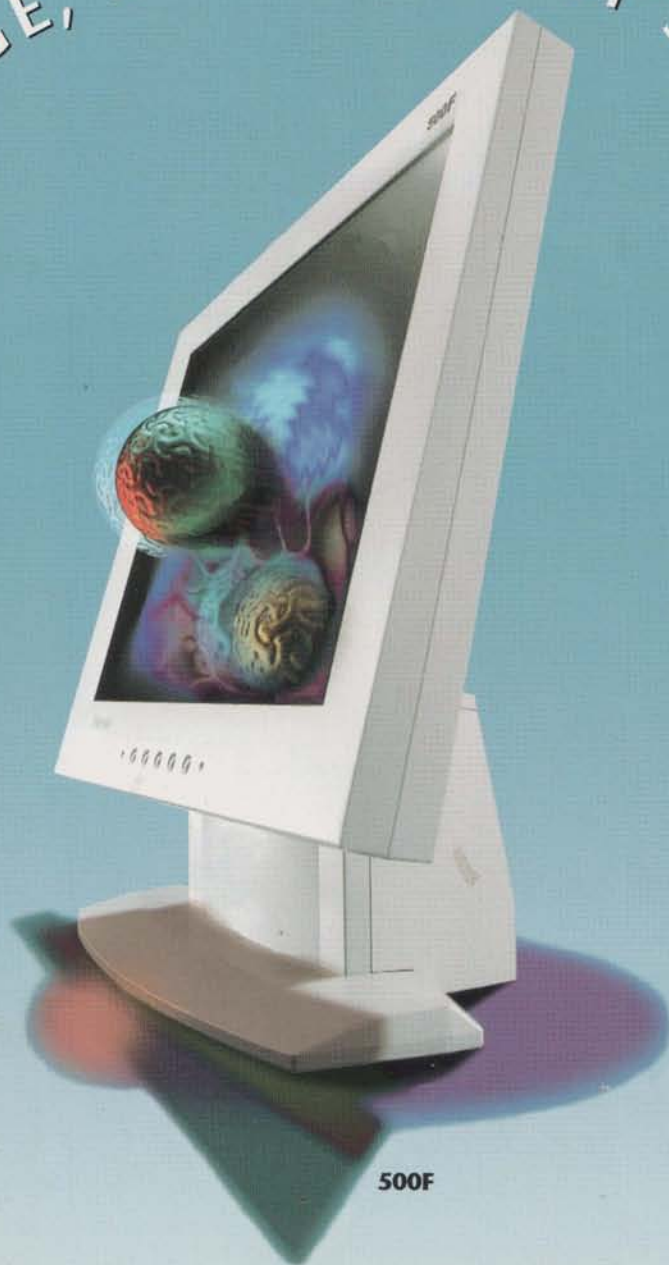
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